April 9, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT

APR 9 1945

DETROIT

"balanced proportions"

THE BASIC PRINCIPLES OF THE NEW TIMKEN ROLL NECK BEARING

This new Timken Roll Neck Bearing embodies design principles that have been tried and proved by millions of Timken Bearing applications in many different types of mechanical equipment and now are demonstrating their value in roll neck bearings.

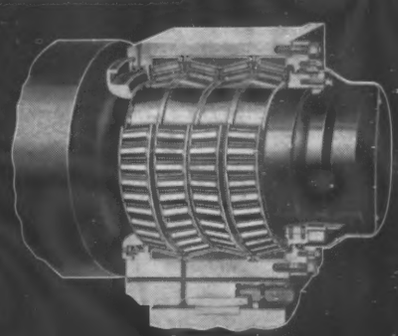
We call this new principle "BALANCED PROPORTIONS". Its development involved a careful study of cone and cup angles; roll diameter to roll length proportions; and other factors.

In BALANCED PROPORTION Bearings the ratio of roll diameter to roll length has been entirely changed and a balance made between bearing bore, width and rating for a given bearing outside diameter. Greater mill separating force capacity is obtained without any sacrifice of neck strength. "BALANCED PROPORTIONS" give a considerable increase in bearing bore for a given bearing outside diameter. Thus larger diameter roll necks can be used and neck stresses are greatly reduced under average load conditions at normal mill speeds.

"BALANCED PROPORTIONS" for mill bearing result in exactly the same neck stress in any size bearings of the new series carrying its given rated load.

We will be glad to work with your mill manufacturer in applying this new bearing with its many important advantages to your new mills.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROLL NECK BEARINGS

COPYRIGHT 1945 BY THE TIMKEN ROLLER BEARING CO.

[PUMP TIPS FROM ALLIS-CHALMERS—ONE IN A SERIES]

How to make WEARING RINGS Last Longer . . .

ANY NEW PUMP you buy is guaranteed to deliver its rating in capacity and head. But whether it *retains* its actual capacity depends to a great extent on the condition of its wearing rings. For when rings are worn thin, liquid leaks through the enlarged clearance between impeller and casing — seriously reducing capacity.

One of the major causes of excessive ring wear is misalignment. So serious can it be, that Allis-Chalmers engineers were led to develop, for many applications, the "Electrifugal" pump — in which *both* impeller and motor are mounted on *one* shaft and in *one* frame. This *unit-design* prevents parts in the pump's closely fitted body from getting out of "kilter" . . . helps you get longer life out of wearing rings.

However, regardless of whether you have a unit-design or separately coupled pump and motor, here are a few tips which will help you get longer wear from rings in your pumps . . .

▸ Never allow a pump to run dry — either through lack of proper priming when starting, or through loss of suction when operating. Remember . . . water is a *lubricant* between rings and casing.

▸ Examine wearing rings at regular intervals. When new, rings in the smaller size, more commonly used pumps should have a diametrical clearance of about 0.006 to 0.008 inch on cold liquid service, and about 0.010 to 0.012 on hot liquid service. When ring clearance becomes 0.020 to 0.030 inch on the diameter it is more economical to replace rings than to pay for power lost in leakage through them.

▸ Gritty liquid or foreign matter in liquid accelerates ring wear. If condition exists, provide intake end of suction piping with a suitable screen to filter out abrasive materials.

▸ Watch pump alignment. Excessive strains from suction or discharge piping can and do distort casing. Wearing rings protect pump from serious damage in this event by themselves taking the wear. However, *before* installing new rings, be sure to check into the *source* of distortion.

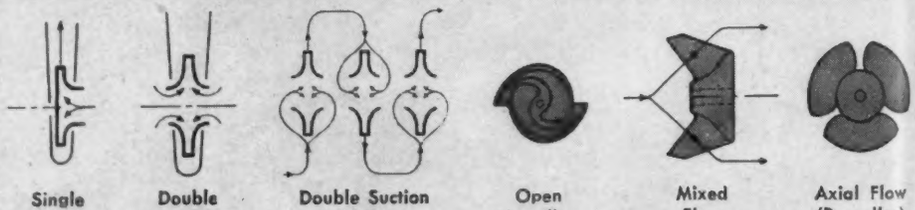
▸ Send for your *free* copy of "Handbook for Wartime Care of Centrifugal Pumps". This valuable booklet applies to *all* makes of pumps; contains *no* advertising. Contents include: tables of friction losses; guide to locating trouble; wartime maintenance schedule. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN. A 1756

Wearing rings on Allis-Chalmers "Electrifugal" pumps are located on both sides of impeller — protecting casing and cover from wear. Their construction depends on the exact nature of the liquid to be pumped. They may be bronze, stainless steel, monel metal or other material with inherent ability to resist destructive action of a specific liquid.

♪ *Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT.*

ALLIS-CHALMERS PUMPS

Allis-Chalmers builds all types and variations of pumps shown at right. Capacities from 10 to 150,000 gpm—heads to 2500 lbs.



More troops by air...

...Farther and Faster

To the growing list of famous Boeing planes, another has been added — the C-97.

A transport counterpart of the B-29, it exceeds all Army Air Force transports in range, payload, and size. The big ship is 110 feet long, has a wingspread of 141 feet, and is capable of carrying more than 100 fully-equipped troops at exceptionally high speeds. Though a military plane, the C-97 is really a peek into the future; for a luxury Boeing Stratocruiser, modeled after the C-97, will make its appearance when the skyways are again peaceways.

Alloy steels by Bethlehem are among the vital materials in the C-97. Here, as in many other phases of the war effort, Bethlehem alloys have been important to the development of newer and better equipment for our armed forces. After victory, they will contribute greatly to better living and progress in the peacetime years ahead.

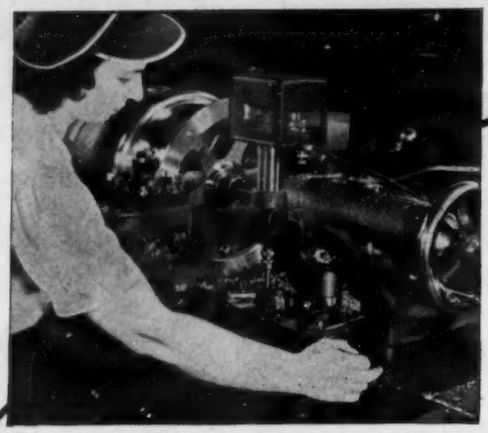
Bethlehem's continued research and experiment have meant better alloy steels. This research has been intensified during the war period. The results are at your disposal if you are engaged in essential work and have a problem involving analysis, properties, heat-treating, or applications.

Bethlehem Steel Company
Bethlehem, Pa.

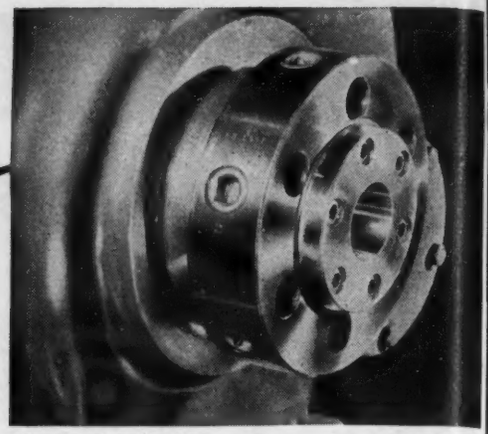
Bethlehem Steel Export Corp., New York City

BETHLEHEM *Alloy* STEELS

BETHLEHEM STEEL



More production—fewer rejects: even without highly skilled operators, this 18" Monarch-Keller lathe showed an 800% increase in machining 26" diameter army tank wheels. Automatic turning from a thin metal template assured continued high-quality production.



Camlock spindle nose: introduced by Monarch in 1929. Retains accuracy during life of the lathe. Saves time in attaching and removing chucks and plates—holds them accurately and rigidly to the spindle.

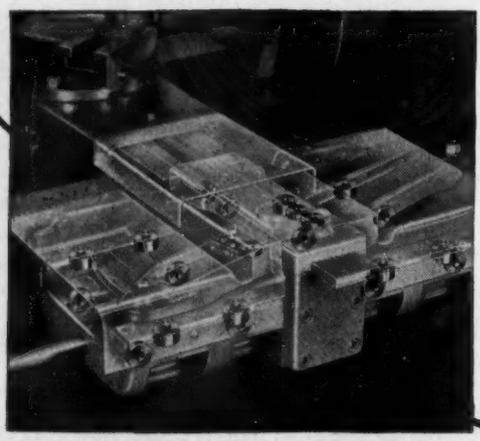
Faulty turning to scrap

BUILT-IN FEATURES RETAIN MONARCH ACCURACY

Only one person profits from inaccurate or badly finished work—the scrap dealer. Losses from such causes have no place in industry when they can be avoided by the use of better, more modern equipment.

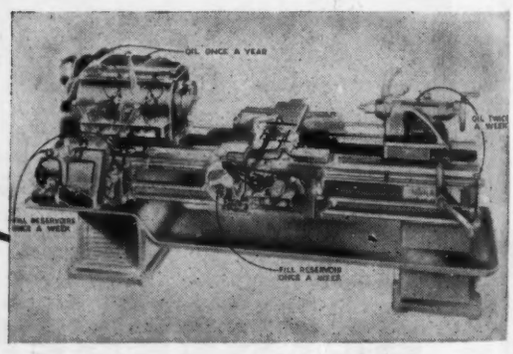
It is no accident that Monarch turning machines reduce such losses. Accuracy is an integral part of Monarch. It's been our creed since the first Monarch was built, more than 30 years ago. Most of the devices to improve turning accuracy were pioneered by Monarch.

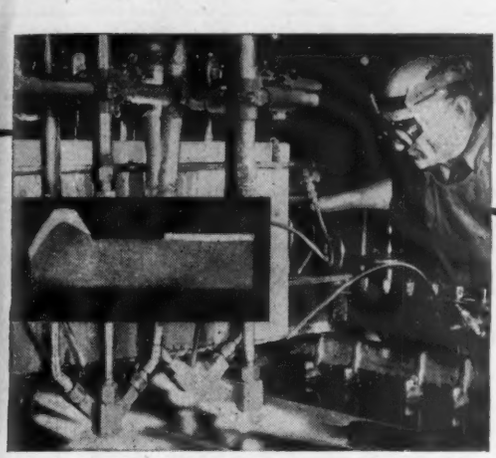
Nor was it just a coincidence that Monarch lathes were specified for so much vital war production, especially in the aviation pro-



Ball-bearing taper turning attachment: turns or bores accurate smooth tapers under all conditions. Permits heavier cuts than with conventional type of attachment. Nothing to wear or get out of adjustment to reduce accuracy of the attachment.

Automatic force-feed lubrication: makes lubrication as "foolproof" as possible by requiring minimum attention from operators or maintenance men. Permits utilization of production and accuracy features to the full power and speed of the lathe.





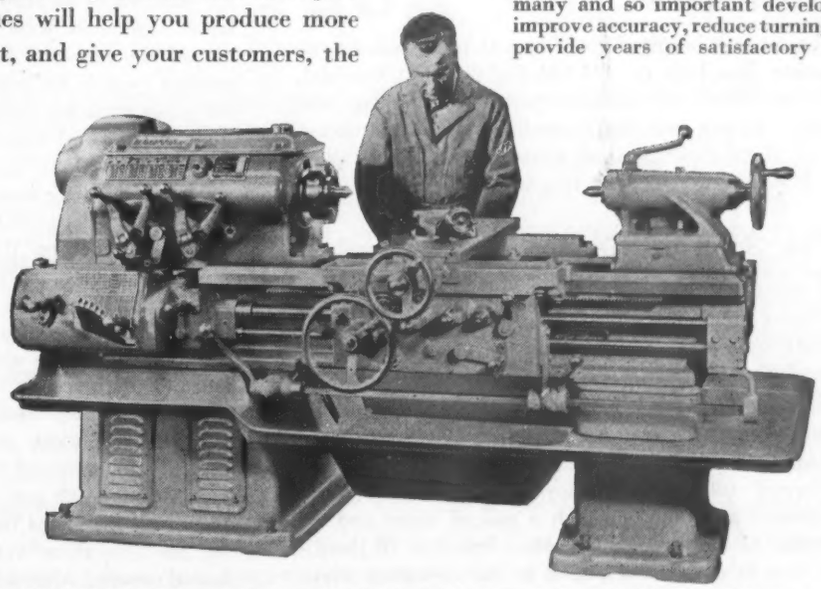
Flame-hardened bedways: **by preventing, under proper use, wearing, scoring, scratching and pitting of bedways, this Monarch development of 1937 helps Monarchs retain their original accuracy throughout the life of the lathes.**

ng pays a profit— up dealers

gram. Plant management had proved from long experience that the last piece of a million-piece lot has the same blueprint accuracy as the first one.

Whether you use your turning machines for toolroom or production work, you can count on Monarch's accuracy. You can depend on them to maintain the pace required for low-cost production. Monarch turning machines will help you produce more goods for more people at lower cost, and give your customers, the American workers, a chance to earn more, buy more, have more.

Monarch Model W 16" Lathe: **Built-in features and advantages developed by Monarch prevail throughout the entire line of toolmakers, production and special Monarch lathes. No other line offers so many and so important developments to improve accuracy, reduce turning costs and provide years of satisfactory operation.**



THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

DIRECT FACTORY BRANCHES

CHICAGO 6, ILLINOIS
422 W. Washington Blvd.
Phone: Randolph 4295

DETROIT 2, MICHIGAN
801 Fisher Building
Phone: Trinity 1-0426

NEWARK 2, NEW JERSEY
635 Industrial Office Bldg.
Phone: Mitchell 2-1770

CLEVELAND 6, OHIO
Room 209 Upper Carnegie Bldg.
10465 Carnegie Avenue
Phone: Garfield 2590

INDIANAPOLIS, INDIANA
Maco Building
38 and College Avenue
Phone: Wabash 2650

PITTSBURGH 22, PENNSYLVANIA
512 Empire Building
Liberty Ave. and Stanwix St.
Phone: Atlantic 6428

Representatives in Principal Cities

Monarch Saves Time

BEHIND THE SCENES

Still Searching

■ And still we search in vain for a power lawn mower. Surely no one can say that advertising in STEEL doesn't pull results; we've seen it happen regularly week in and week out for years. But, of course, the normal reason for advertising isn't to locate the proverbial needle in a hay stack, and we're afraid that's what we may be doing.

Some very nice people wrote us some very nice letters but all the rascals had to say was that if we found ourselves with an extra mower on our hands that they would be happy to relieve us of one! But we're not giving up so easily—the life of STEEL is long and our faith is strong.

One Square Smile

■ D. C. Turnbull, chief engineer, American Foundry Equipment Co. adds his protests to that off-base statement that a man shaves 20 square miles of face in a lifetime. His slide rule comes up with the answer that it would take forty barbers shaving six men per hour, eight hours per day about fifty years to shave just one square mile. He gracefully concludes, however, that he got a square smile out of it anyway, and will still continue to believe some things he reads in STEEL.

R. J. Woods, Jr., manager of tube sales, Jones & Laughlin Supply Co., says he believes the correct statement is that a man shaves 20 linear miles of face during a lifetime, which would be 5.786 feet of face the width of a razor per shave, which isn't far off. Incidentally, he's one of those rascals who tells us he'll be glad to take any extra mowers we get off our hands.

Secret Weapon?

■ The rat trap business would appear to be picking up. The navy has bids on 144,432 for delivery, Oakland, California, which may indicate the traps are for Jap-bred rodents. At any rate, the Animal Trap Co. of America, McGill Metal Products, and Lovell Mfg. Co. are all in with bids and may the best trap win.

In The Good Old Days

■ If you think your job is tough and that your working conditions aren't everything the doctor ordered, take a peek at these rules, written some 80 years ago, by the original Carson, Pirie Scott & Co., of Chicago:

Store must be open from six in the morning until nine at night the year 'round. Store must be swept, counters, base shelves and showcases dusted; lamps trimmed, filled and chimneys cleaned; pens made; windows and doors opened; a pail of water and a bucket of coal brought in before breakfast (if there is time to do so) and attend to the customers who call.

The employe who is in the habit of smoking Spanish cigars, getting shaved at the barber shop, going to dances and other places of amusement, will surely give his employer reason to be suspicious of his integrity and honesty.

Each employe must pay not less than $5.00 a year to the church and must attend Sunday school regularly.

Men employes are given one evening a week for courting and two if they attend prayer meeting.

After fourteen hours of work in the store the leisure hours should be spent mostly in reading.

Time Capsule

■ We happened to run onto something the other day about the Westinghouse "Time Capsule", that 800-pound letter for historians which was deposited fifty feet below the surface of the New York World's fair grounds and is to be dug up and read in the year 6939. Certainly it should be a terrific temptation to open up the capsule at the end of this war and do a little editing on what this current generation is like and what progress in scientific achievement it has made. Just stop and think for a moment all that will have come out of the war that we know about already and certainly your imagination can do plenty of tricks on the things that are still undercover. Radar, jet-propulsion, freighters of the air, walkie-talkies, practical television, the inimitable jeep, mass production such as had never been imagined. And surely we all hope and pray and must believe that out of it, too, will come a more equitable distribution of the world's production, a permanent peace among men, and a better understanding among nations built on self-respect, integrity and mutual cooperation.

Ain't Education Wonderful?

■ If you think you can't understand the younger generation, consider the English teacher who got this from one of his sophomores as an essay on Early Man:

"Around 900,000 B. C., a bunch of long hairs hung out somewhere in Europe. Living conditions weren't so hot. Arguments were frequent. Every now and then one of the hep cats would get sore over some square making eyes at his pigeon and would play a bolero on his scalp with his club. The local Charley Altas was the king-pin and generally had four or five dollies to pitch woo with.

"Naturally there were lots of snakes and animals that kept the populace on their toes. Every now and then one of these Orson Welles nightmares would poke his snoot into a hen party and increase his waist line by two or three people. Organized resistance was the result. Gathering bats and other weapons, the guys hit for the high weeds and rustled out a dinosaur or two and put the blocks to him.

"For food they used to take turns slugging a smaller animal. When one of the fellows knocked off a dinner, the town would toss a clam bake. All the local yokels came in on part of the grub. 'Course the head guy would fill his chops first. By the time it got around to the last one, there wasn't enough left for a blue bird's hors d'oeuvres. After a few weeks of this DuBarry diet, he would pull a few feet of terra firma over him and make with a harp.

"There wasn't any gasoline in those days. In fact, the closest they came to gasoline was when the Sinclair dinosaur paid his daily visit. Well, if you ask me, living conditions were pretty punk then. Sooner I should go to Emil's and beat a rug to a hot platter."

Vol. 116, No. 15, April 9, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 69

One of the newer products which has proved very successful for repair and maintenance of electric furnace sidewalls is Gunmix, applied to hot basic brick with the Gunmix air-gun.

ASK THE "BASIC" MAN YOUR $64 QUESTIONS

ALWAYS ready to help you, the Basic Sales Engineer who calls on you invites your questions. He may not know all the answers, but he is in position to help you find them . . . if it's a furnace refractory problem that's bothering you.

Basic Refractories' service is broadening steadily, the better to serve the steel and metal working industries. Nearly every steel producer knows and has used for years our standard refractories for basic open hearth and basic electric furnaces — hearth refractories for new construction, for major and emergency repairs, for heat-to-heat maintenance. More recently you have been acquainted with Basimix for forge and billet-heating furnaces and with Gunmix products for the maintenance of vertical side walls of electric and open hearth furnaces, soaking pits and other types of heating furnaces. Other products, too, and practical application methods are under way.

The Basic Sales Engineer's job is to help you use these products more effectively ...not only in the usual, long-established ways, but also to meet the more difficult, unusual situations. He has a wealth of knowledge and experience in refractories to place at your disposal, and even more important from your standpoint, perhaps, he is a practical steel man. He has spent years actually making steel.

So don't hesitate to take advantage of the "Basic" man's desire to help you in any way he can. Ask him your $64 questions.

BASIC REFRACTORIES, INCORPORATED 845 HANNA BUILDING *Cleveland 15, Ohio*

In 1823 when the Monroe Doctrine was written

Freedom Forge, then 28 years old, was producing 15 tons of blooms per week

When President Monroe scratched his signature on the doctrine that bears his name, America's industrial age was young. The first American steamboat had crossed the Atlantic only 4 years before; the opening of the Erie Canal was 2 years in the future; the safety lamp, the stethoscope, and the kaleidoscope were recent inventions. Yet Freedom Forge had already served America for almost three decades, and expanded and improved its plant by installing a stack 20-feet high and a bosh 7-feet in diameter. These developments stepped up the output to 12 to 15 tons of blooms and bar iron a week!

Both the changes and the results seem small in the light of today—but they symbolize a progressive spirit that has continuously ruled the organization. The Standard Steel Works, a direct descendant of Freedom Forge and still doing business at the original location, has pioneered methods and processes that make "Standardize on Standard" a dependable guide to the best in forgings and castings. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pennsylvania, U. S. A. Offices: Philadelphia, New York, Chicago, Washington, Boston, Cleveland, St. Louis, San Francisco, Houston, Pittsburgh, Detroit.

BALDWIN

STEEL FORGINGS & CASTINGS

Here's what your money buys in a NORTHWEST!

HERE are advantages that mean increased output and speed with lower maintenance costs. Many of them are found on no other machine and together they bring you a combination that gets things done.

Simplicity of Design • "Feather-Touch" Clutch Control • Worm Boom Hoist • Helical Gear Drive • Uniform Pressure Swing Clutches • Easy Control and Stearing • Demountable Drum Lagging • Cushion Clutch • Cast Steel Bases with Cast Steel Machinery Side Frames • Ball and Roller Bearings on all High Speed Shafts • Splined Shafting • Fully Enclosed Crawler Gears • Chain Drive to Crawlers • Easy Convertability to Shovel or Dragline.

You'll want to ask questions about these features and how they will help you. Let us send you the booklet, "Getting Things Done."

NORTHWEST
ENGINEERING CO
1805 Steger Bldg
28 E. Jackson Blvd
Chicago 4, Ill

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Have you rea the NORTHWES AD Today

THINGS A
THWEST WILL DO!
ndle coal and ashes.
ad and unload any
nd of conveyance.
andle any type of
aterial, loose or solid.
andle magnet for scrap,
urnings and borings.
oes any place to make
ut-of-the-way corners
f the yard usable.

BUILT IN A RANGE OF 18 SIZES — ½ TONS CAPACITY AND LARGER

Let's get acquainted
INVESTIGATE THIS Different
CRAWLER CRANE

NORTHWEST

The Crane that goes Anywhere!

RUST IS WASTE...

Sova-Kote Your Metal

There's a correct S/V Sova-Kote to meet your specific requirements. Stop Rust Before It Starts!

LIKE a thief in the night, rust attacks the products of your plant. It's an ever-present threat to unfinished parts between operations. It goes to work on finished parts in transit and in storage.

The best way to guard against this threat is to make sure that you have a proved rust preventive suited to your particular needs.

No matter what your requirements may be—indoor or outdoor protection, simple or intricate parts, light or heavy-duty service, hot or cold application—you'll find the correct answer in the complete S/V Sova-Kote line. For this line includes outstanding products developed to solve all current rust prevention problems.

On your request, your Socony-Vacuum Representative will study your special needs and help you select and apply the best possible rust protection. Why not get his expert advice and stop rust on your products before it starts?

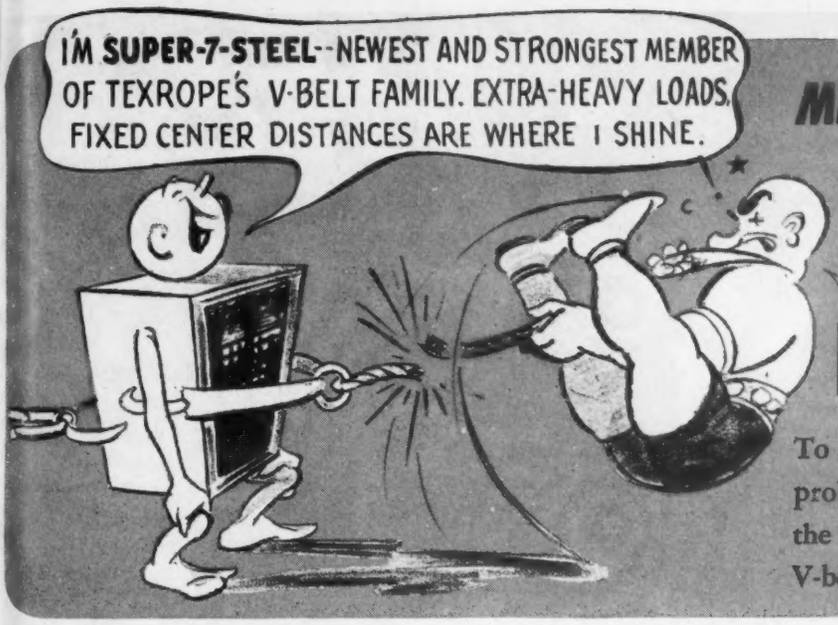
SOCONY-VACUUM OIL CO., INC.
Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California.

GARGOYLE Lubricants

SOCONY-VACUUM'S 5 Steps to Lower Production Costs:

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

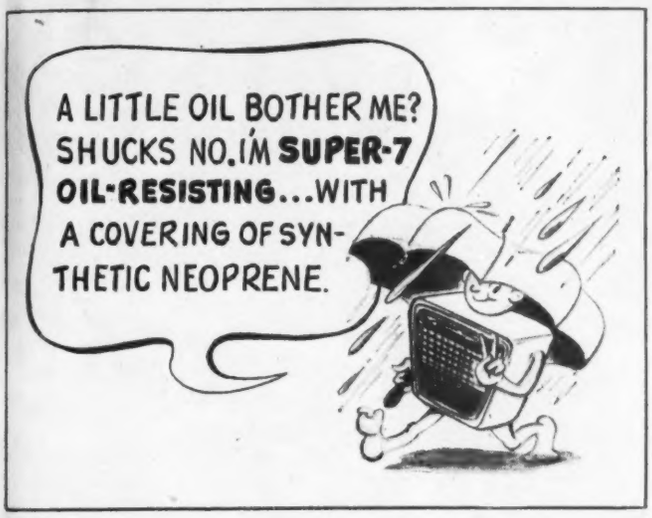
TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC

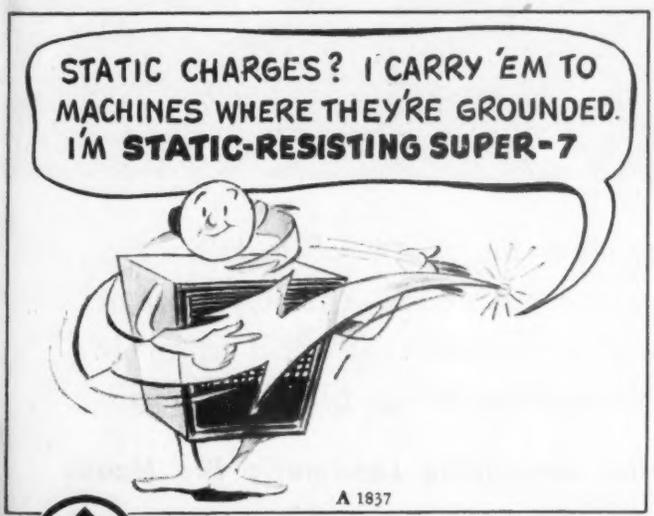

I'M SUPER-7-STEEL--NEWEST AND STRONGEST MEMBER OF TEXROPE'S V-BELT FAMILY. EXTRA-HEAVY LOADS, FIXED CENTER DISTANCES ARE WHERE I SHINE.

MEET ALLIS-CHALMERS FAMOUS

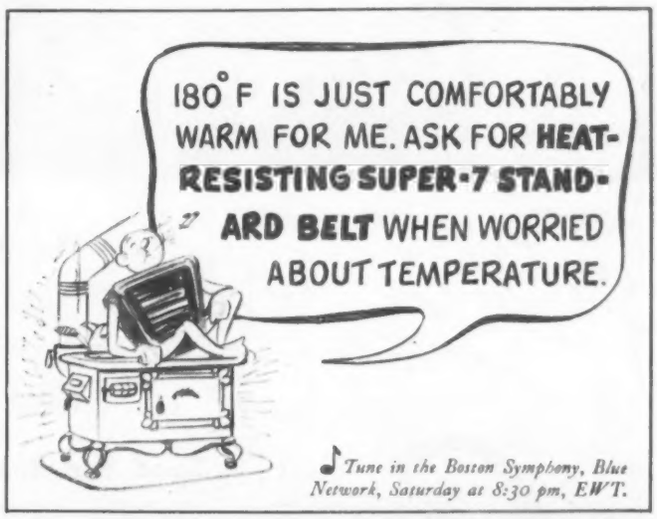
V-Belt Family!

To lick each of your different belt problems, you'll be sure of finding the right belt in America's widest V-belt line... Allis-Chalmers' Texrope!





A 1837

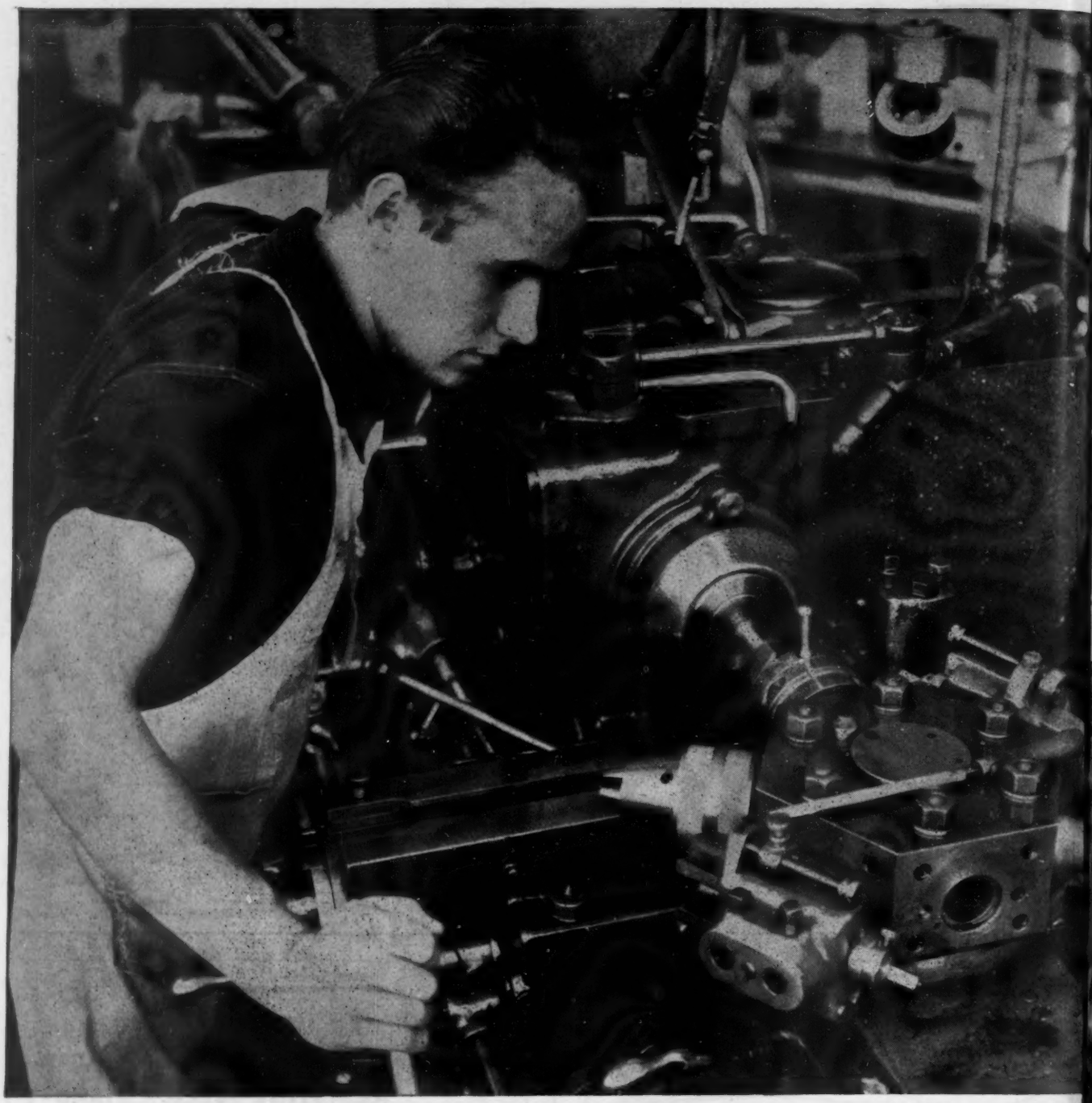


♩ *Tune in the Boston Symphony, Blue Network, Saturday at 8:30 pm, EWT.*

IT PAYS TO MAKE ALLIS-CHALMERS YOUR

V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.



The few operating parts of LANDIS Die Heads and their precise assembly make it possible to produce threads within extremely close tolerances on a high production basis.

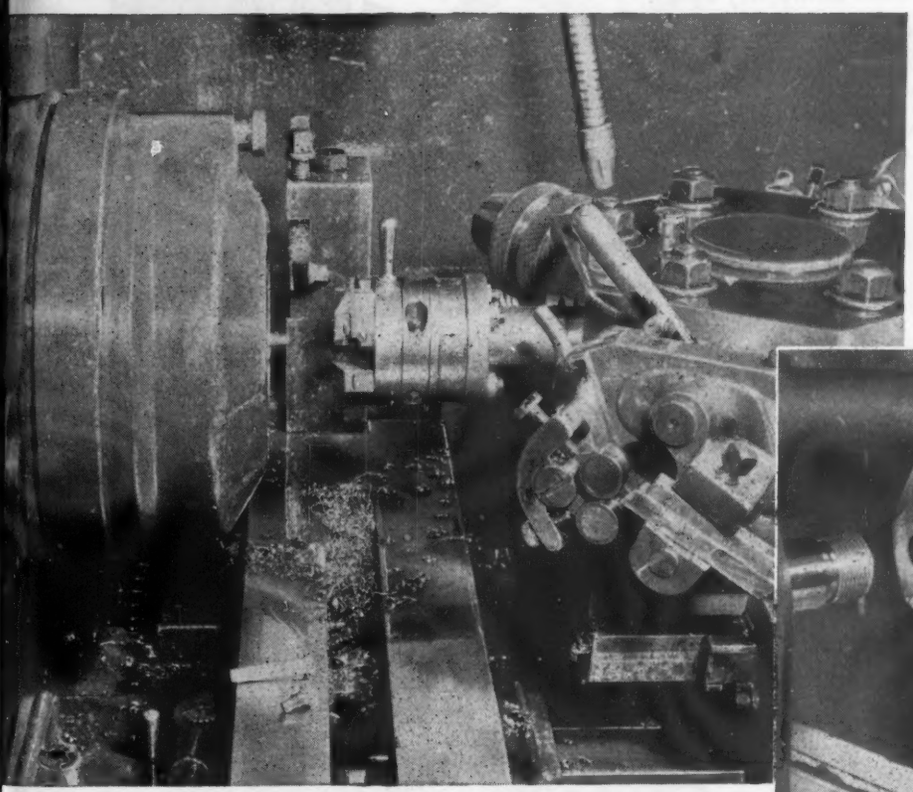
Send for Bulletins describing Landmatic Die Heads

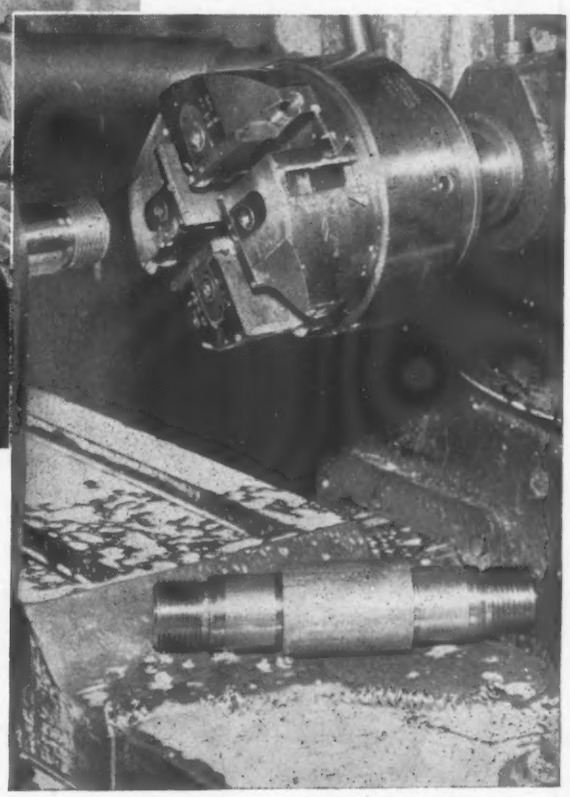
LANDIS MACHINE CO.

THREADING MACHINES · COLLAPSIBLE TAPS · PIPE THREADING MACHINERY

LANDMATIC

Hardened and Ground or Heat Treated DIE HEADS Are Used in Turret Lathe Operations in Most Aircraft Plants





WAYNESBORO
PENNA·U·S·A·

DIE HEADS · CHASERS

Instant, finger-tip speed-change

If you could operate an "RPMster" for a few minutes, you'd know exactly what we mean by instant speed change. At a touch of the lever mounted at the head of the drill your spindle speed is increased or decreased—instantly. Because there are no pulley steps for belt shifting the speed variations are very close together, so that changes thru the entire speed range are smooth. With this machine, using quick change chucks, several different types of operations can be made in the same set-up—each employing the PROPER SPEED. Spindle speeds may be changed while actually drilling.

Heavy duty construction of all parts assures long life. Speed and convenience of operation mean satisfactory usage. Price is lower than you might expect. Why not write today for Bulletin 3257 which gives details on single and multi-spindle models?

WRITE for Bulletin 3257

Buffalo Forge Company

158 Mortimer St. **Buffalo, N. Y.**

Canadian Blower and Forge Co., Ltd. Kitchener, Ont.

ARMY E NAVY

"Buffalo"

RPMSTER —"the Drill with 100 Speeds"

THE CASE OF THE WEATHERED BULLET HOLE

. . . . a clue to better paint adherence

Look to the left—those specimens show (top) the damage to the painted surface of a hot galvanized steel sheet when pierced by a bullet and (bottom) the attack of rust after a three-month exposure to weather. Now turn to the right—those specimens, painted on Republic ELECTRO PAINTLOK, were given the very same test, but notice the difference.

You've seen the evidence above, showing what happens to painted outdoor metal signs when struck by bullets or rocks. And this same evidence applies to other painted sheet metal products when scratched or dented.

YOUR clue to the old, troublesome problem of securing tight and lasting adherence of paint to a zinc coated surface is the performance of Republic ELECTRO PAINTLOK.

This electrolytically zinc plated and chemically treated sheet was developed by Republic to provide exceptional paint adherence without additional preparation. The tenacious zinc coating will not peel, flake or powder even during severe fabrication. And it protects against rust should the paint film be broken.

Do you make or plan to make products with painted surfaces on sheet steel—such as signs, cabinets, truck and trailer bodies, refrigerator cases or washing machine lids and cabinets? Then Republic ELECTRO ZINC PLATED Sheets can help you improve quality —*probably at lower cost.* Now's the time to find out by writing to:

REPUBLIC STEEL CORPORATION

GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, New York

Republic Electro Zinc Plated Sheets include ELECTRO PAINTLOK in widths up to 60 inches and gauges from 12 to 24, and ELECTRO ZINCBOND in widths up to 48 inches and gauges from 25 to 37.

Republic

ELECTRO ZINC PLATED SHEETS

Electro Paintlok • Electro Zincbond

Reg. U. S. Pat. Off.

Other Republic Products Include Carbon, Alloy and Stainless Steels — Sheets, Strip, Plates, Bars, Pipe, Tubing, Bolts and Nuts, Wire, Fabricated Products

THESE HIGH-SPEED STEELS ARE YOUR ASSURANCE OF

STAR PERFORMANCE

STAR performance in your cutting tools is guaranteed when you specify them to be made of any of the high-speed steels listed here. For every one is made according to a genuine MO-MAX formula. It was MO-MAX molybdenum-tungsten high-speed steel which was the *first* to prove itself commercially successful. Today MO-MAX leads the field, being widely used in tool bits, forming tools, circular saws, milling cutters, broaches—and for other applications demanding supreme toughness and resistance to abrasion.

FOR COMPLETE INFORMATION . . . send for the NEW 1945 MO-MAX HANDBOOK. In it you'll find examples of tool performance—how and why MO-MAX was developed—how to select MO-MAX for *your* job—and many other facts you'll want to know about this unusual steel. Your copy will be mailed upon receipt of your name and company connection. Write today to Dept. A.

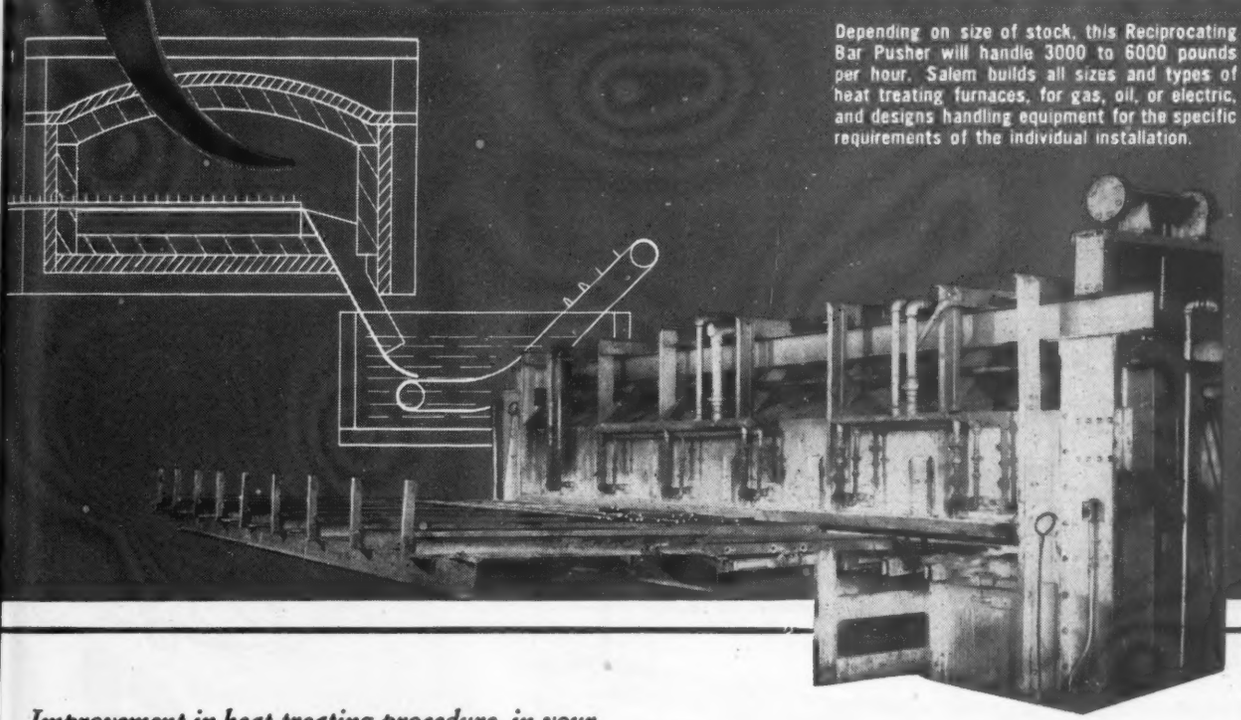
THE CLEVELAND TWIST DRILL CO.
1258 East 49th St. Dept. A Cleveland 14, Ohio

THEY'RE ALL **MO-MAX**

SALEM APPLIES

ENGINEERED HEAT...

TO HANDLING AND HEAT TREATING BAR STOCK



Depending on size of stock, this Reciprocating Bar Pusher will handle 3000 to 6000 pounds per hour. Salem builds all sizes and types of heat treating furnaces, for gas, oil, or electric, and designs handling equipment for the specific requirements of the individual installation.

Improvement in heat treating procedure, in your plant, may be a matter of efficient handling.

For instance, this Reciprocating Pusher mechanism designed by Salem Engineering Co., feeds one bar at a time automatically. Each bar rolls forward (not back and forth) through the furnace on a predetermined time cycle, and drops into the oil or quench tank underneath the furnace.

Each round receives uniform exposure to the heat. You save fuel, since the mechanism only has to be heated once and the automatic handling speeds production. Several months ago, as a result of proved experience with ½" to 3" diameter rounds, Salem adapted this mechanism in two large shell plants to the heat treating of 8" shell forgings.

Salem, builders of the world's largest rotary forge furnace and designers of the circular soaking pit, combines engineering with economics in designing furnaces and handling equipment to suit specific heat treating requirements.

Send Salem your next heat treating inquiry.

SALEM **SALEM** OHIO

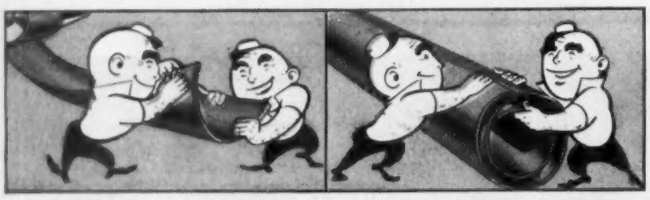
ENGINEERING CO.

SALEM ENGINEERING COMPANY

INVESTIGATE
BUNDYWELD STEEL TUBING

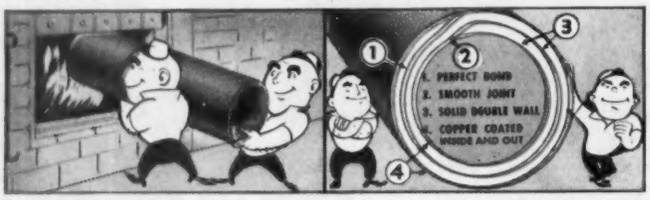
ITS SOLID DOUBLE WALL CONSTRUCTION MEETS ALL TESTS

HOW BUNDYWELD IS MADE



1 Bundyweld Tubing is made by a process entirely different from that used in making other tubing. A single strip of copper-coated S.A.E. 1010 steel is continuously rolled twice laterally...

2 ..into tubular form. Walls of uniform thickness and concentricity are assured by the use of close tolerance cold rolled strip. This double rolled strip passes through a furnace where the . . .



3 . . copper coating fuses and alloys with the double steel walls. After brazing and cooling, it becomes a *solid* double wall steel tube, copper brazed throughout 360° of wall contact . . .

4 . . copper coated inside and out, free from scale, and closely held to dimensions. Hard or annealed in standard sizes up to 5/8" O.D. Special sizes cold drawn. Also furnished in Monel.

1 HIGH FATIGUE STRENGTH

2 CLOSE TOLERANCES

3 HIGH BURSTING STRENGTH

4 EASY FABRICATION

SEND FOR THIS BOOKLET ON SMALL DIAMETER TUBING

Of particular value to production and design engineers interested in hydraulic, lubricating and fuel lines. 16 pages of technical data and fabricating information on *Bundyweld* steel and *Bundyweld* Monel tubing with complete description of the double flare.

BUNDY TUBING CO.
10959 Hern, Detroit 13, Michigan
Gentlemen:
Forward my copy of the Bundyweld Booklet to

*Name*_____
*Title*_____
*Company*_____
*Address*_____
*City*_____ *Zone*_____ *State*_____

BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS

BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES:

Pacific Metals Company, Ltd.
3100 19th Street
San Francisco 10, California

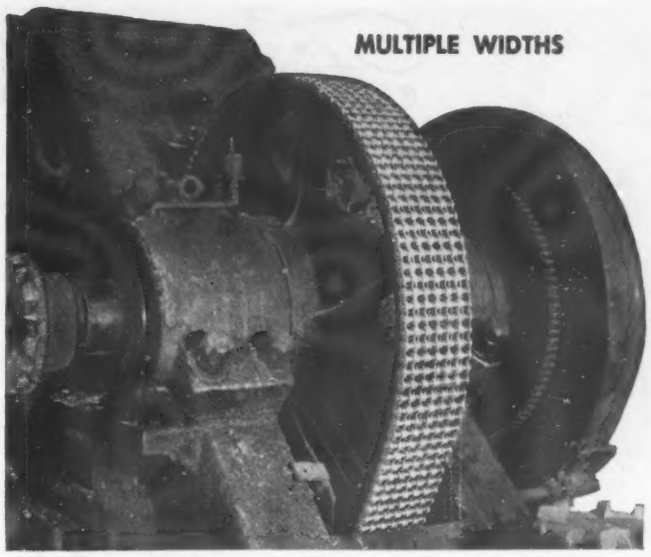
Standard Tube Sales Corp.
1 Admiral Avenue
Maspeth, New York City, N. Y.

Lapham-Hickey Company
3333 W. 47th Place
Chicago 32, Illinois

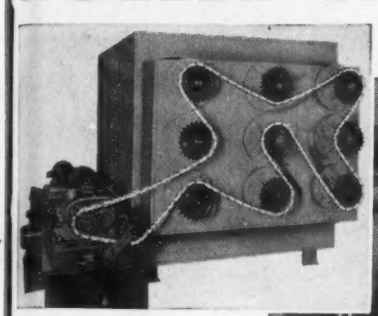
Rutan & Company
112 South 16th Street
Philadelphia 2, Pennsylvania

Eagle Metals Company
3628 East Marginal Way
Seattle 4, Washington

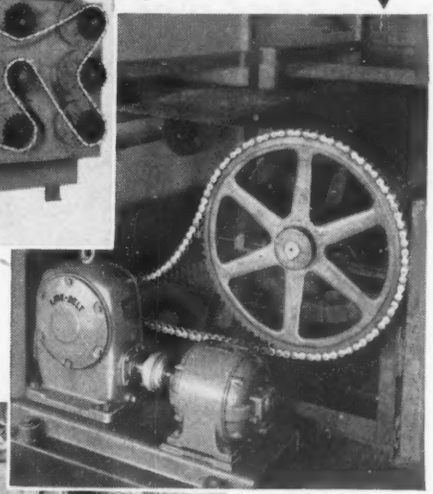
WHAT *Can't* YOU DO *with* LINK-BELT *Silverlink* ROLLER CHAIN?

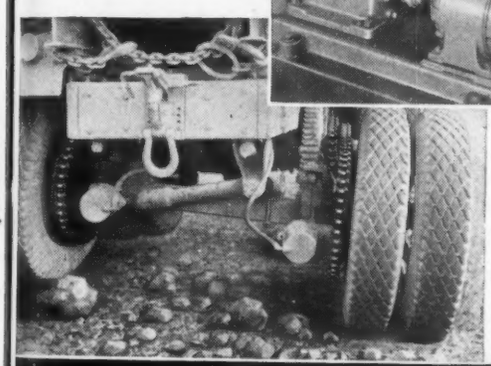


MULTIPLE WIDTHS



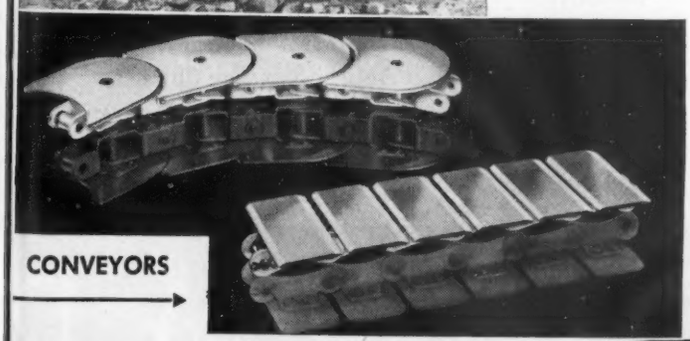
MULTIPLE SHAFTS



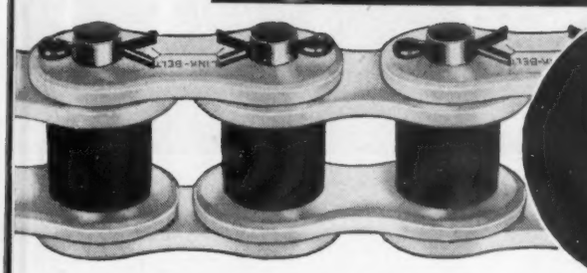


POSITIVE RATIO

TWIST TYPE FOR MOBILE EQUIPMENT



CONVEYORS



MODERN DESIGN Continually Utilizes its Basic Advantages

● Designers and manufacturers seeking new versatility and new efficiency in their products rely more and more on the numerous advantages of Silverlink Roller Chain.

Positive transmission of power means perfect timing and coordination of machine operations. Shafts in any number, in any arrangement, can be given either direction of rotation, on long or short centers. While slip or creep is impossible, resilience of chain absorbs heavy shock loads, thereby protecting motor and driven machine.

Depend on Link-Belt Silverlink Roller Chain for efficiency and long service in power transmission and conveying. Write for Engineering Data Book 1957.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in principal cities.

9043

LINK-BELT *Silverlink* **ROLLER CHAINS**

Finding "better ways"...

A 56 YEAR HABIT *at Peninsular*

DAY AFTER DAY for more than 56 years, Peninsular engineers have carried on their search for new materials—new methods—better ways to manufacture grinding wheels and apply them to the problems of production in industry.

How well they have succeeded is reflected in the excellent reputation which Peninsular enjoys throughout heavy industry and wherever grinding wheels are used.

It can also be measured by the fact that many of the basic advancements in the fabrication of grinding wheels—in the machinery for their manufacture—and in their application to modern industrial problems have come from Peninsular.

Yes, finding "better ways" is definitely a habit with Peninsular—a habit you can count on in the future as industry turns to peacetime production.

A STANDING INVITATION

Our expert staff of factory and field engineers are ready today to help in your preparation for regular production—with an engineering and cost analysis service beyond any offered up to now in industry.

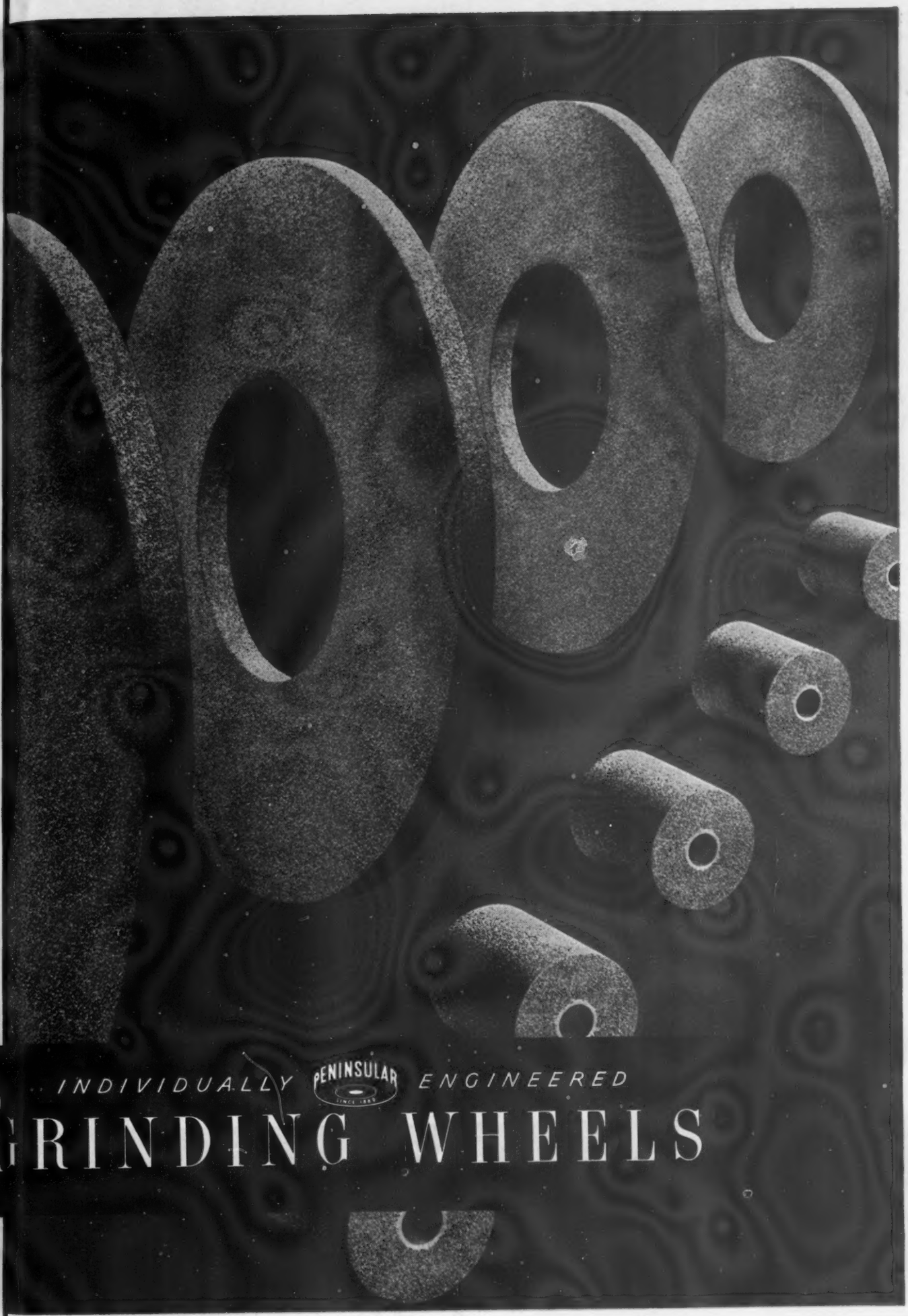
The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7, Mich. *Branches:* Chicago, Cleveland, Newark, Philadelphia, Pittsburgh.

SPECIALISTS IN RESINOID BONDED WHEELS

PENINSULAR

SINCE 1889

Types of Wheels for Rough Grinding


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

How consistent testing saves you trouble

BY subjecting every product to a series of tests before it leaves its factory, "CARBORUNDUM" saves industry an untold amount of grief. Uniformity of the abrasive means uniform wheel performance. Absence of flaws reduces down time in your shop. And these checks assure you that each product by "CARBORUNDUM" is the type of dependable abrasive tool you need for your job.

But there is still more involved in the production of good grinding wheels, coated abrasives and special products. It is equally important to get the particular abrasive combination best suited to the job. Your "CARBORUNDUM" Representative is the man to help you do that. And his efforts are supplemented by the knowledge of the "CARBORUNDUM" Abrasive Engineers. These are the men who have helped perfect a large share of the abrasive processes which have become standard. The Carborundum Company, Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

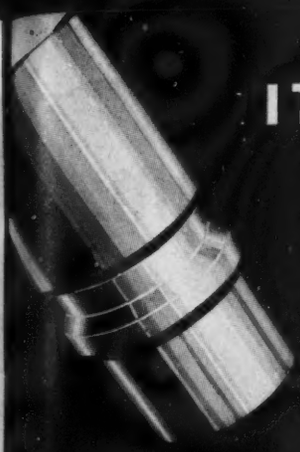
FOR EVERY ABRASIVE APPLICATION

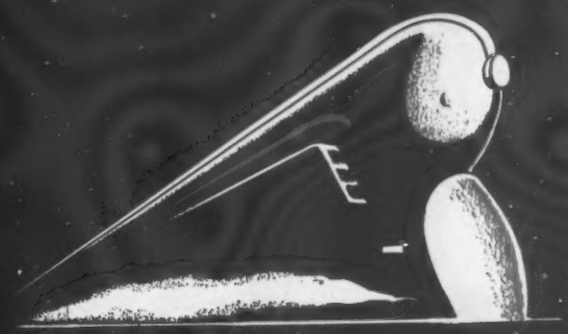
("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

IT TAKES MODERN EQUIPMENT

to produce Tomorrow's

STREAMLINED PRODUCTS





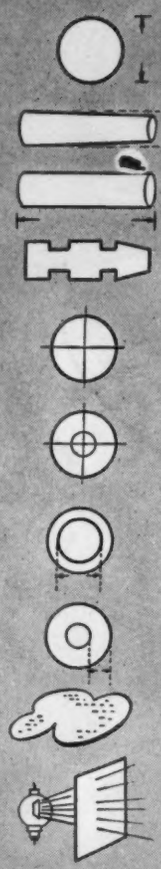
HANSEN *Push-tite* COUPLINGS

Tomorrow's production is going to be the answer as to how you can meet keen competition in the highly competitive market of the coming postwar days. ◆ Competition cannot be met without peak production and peak production cannot be attained without modern equipment, one fits into the other. ◆ One way to reach peak production is by short cuts and that, in turn, means Hansen Industrial Couplings, which are easier to operate, faster, save many steps, much time and a considerable volume of air. ◆ Hansen Couplings are easy to operate, merely insert plug into socket, it is connected, locked and air is automatically turned on. To disconnect, slide sleeve back with thumb, plug is ejected and air is automatically turned off. ◆ *There's a Hansen Coupling made for air, oil, grease, gasoline, oxygen and acetylene. Send in for free industrial catalog.*

THE HANSEN MFG. COMPANY

1786 EAST 27th STREET • CLEVELAND 14, OHIO

Are these INSPECTION problems *Yours?*



DIAMETER

TAPER

LENGTH

PROFILING

ECCENTRICITY

CONCENTRICITY

INSIDE DIAMETER

WALL THICKNESS

TURBIDITY

TRANSPARENCY

• Will old inspection problems be met with old methods in your post-war production? During the past seven years we have developed electronic equipment to solve many different inspection and control problems. The soundness of the principles involved has been further proven through Hurletronic equipment which we have designed and built for many wartime applications.

In the postwar world these same proven principles can be successfully applied to many new problems, providing improved efficiency and greatly reduced costs. Perhaps there are important applications for such equipment in your own plant. Let us make plans now so they can be developed without delay when victory has been won.

We shall be glad to discuss with you any problem of inspection and control and submit our unbiased recommendations. Your inquiry incurs no obligation.

Hurletron AB48-100. This machine automatically, electronically checks an inside diameter at the rate of 4000 pieces per hour.

HURLETRON

ELECTRONIC INSPECTION AND CONTROL EQUIPMENT

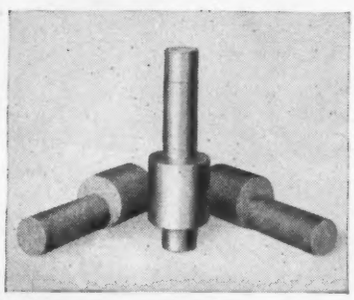
ELECTRIC EYE EQUIPMENT COMPANY • 11 West Fairchild Street • Danville, Illinois

JOHNSTON & JENNINGS HAMMERED FORGINGS

Like a department of your own plant

● Because we can deliver hammered forgings exactly *as* you want them,—on schedule *when* you want them, Johnston & Jennings has served the carbon and alloy steel forging requirements of some of the country's leading manufacturers year after year.

Hammers ranging from 600 to 4,000 lbs. falling weight, and modern car-type normalizing and annealing furnaces enable us to handle a wide variety and size of work, and meet exact physical requirements. Our extensive machine facilities permit the work to be delivered either rough forged, shot blasted, rough or finished machined, depending upon conditions in the purchaser's plant and his facilities for further processing. Send for Bulletin No. 421,—it gives full details—and "Check with J & J" on your next forging job.



▲ *Above,*—Eccentric Shafts Furnished Rough or Finish Machined, Carbon or Alloy Steels. *Below,*—Forged, Heat Treated and Rough Turned Spindles, Sleeves and Rings. ▼

THE JOHNSTON & JENNINGS CO.

905 Addison Road • Cleveland 14, Ohio

HAMMERED FORGINGS, HOLLOW BORING AND ALLIED SERVICES

WHY DO WAR ENGINES NEED Forged Crankshafts?

❶ The flow lines of the metal structure must be directioned into correct position to provide utmost strength and toughness to meet stresses exactly where they occur in actual service. During the forging process the large crystals are refined to produce greater density in the metal structure.

❷ Correct forging technique positions the steel *in the first forging* operation so as to utilize the flow lines or fibre-like structure to develop maximum strength and toughness in the forging where it is most necessary.

❸ Cross-sectional views show that the penetration of the hammer work is most intense exactly where the stress on the crankshaft is the highest.

❹ At the center of the crankshaft, flow lines are less dense. Where the stress on the crankshaft in actual service is greatest, there the strength-producing effects of forging in closed impression dies are most apparent.

❺ The 12,000-lb. Erie Steam Hammer illustrated is producing crankshafts for war engines. Consult Erie Engineers on your forging problems.

ARMY E NAVY

ERIE

Write for Bulletin 340

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA

ERIE BUILDS *Dependable* HAMMERS

Balk Corrosion on Zinc or Cadmium The Fast, Sure, Iridite Way

Test this free panel. See for yourself how Iridite battles corrosion—and wins

Check these Quick Facts on Iridite

- ✓ **Corrosion Resistant.** Iridite *unites chemically* with zinc or cadmium, forms a highly corrosion-resistant surface.
- ✓ **Easy to Apply.** Apply Iridite by simply dipping immediately after the last rinse tank in your plating line. Parts dry in a few seconds, may be handled or shipped at once.
- ✓ **Dimensions Unaltered.** Because it unites chemically with the metal, Iridite does not alter dimensions of or interfere with the functioning of the most finely articulated parts.
- ✓ **Completely Flexible.** Iridited parts may be bent or twisted without flaking, chipping or peeling.
- ✓ **Attractive Colors.** Currently available are blue, green, red, bronze, olive drab and black. All can be clear-lacquered for still greater durability.
- ✓ **Firm Paint Base.** Iridite holds paint permanently —prevents formation of that soapy, chalky underlayer that destroys adhesion.

WANT to see with your own eyes how quickly-applied Iridite increases corrosion resistance of zinc and cadmium? Coupon below will bring you a panel to test in your own laboratory. Half the panel is Iridited; give the whole panel any corrosion test you wish—*and just look at the difference between the two halves.*

Then do this. Picture to yourself your cadmium plated, zinc die cast, plated or galvanized products—present or postwar—protected and beautified by Iridite. Use Iridite as a paint base and your product holds its paint permanently. Use it as final finish and its attractive colors mean added eye-appeal and salability.

And here's something else. Iridite's qualities vastly widen the usefulness of zinc and cadmium. Many manufacturers who would have used more expensive metals will now use zinc, protected and beautified by Iridite.

Iridite's something you'd better look into—and right away. We suggest you begin, as so many manufacturers have—by testing a sample in your laboratory, with your present or future products in mind. Attached coupon will bring it to you. Act today.

RHEEM RESEARCH PRODUCTS, INC.

IRIDITE

2523 Pennsylvania Ave., Baltimore, 17, Md.

Branches—570 Lexington Ave., New York 22; 20 E. Jackson Blvd., Chicago 4; 2411 Sichel St., Los Angeles 31. Distributors in: Waterbury; Grand Rapids; Detroit; Cleveland; Los Angeles; Long Island City; St. Louis.

Rheem Research Products, Inc.,
204 Chemical Bldg, 2523 Pennsylvania Ave., Baltimore 17, Md.

Gentlemen: Please send me a free test panel of Iridite-treated zinc plate. Also full information and operating details.

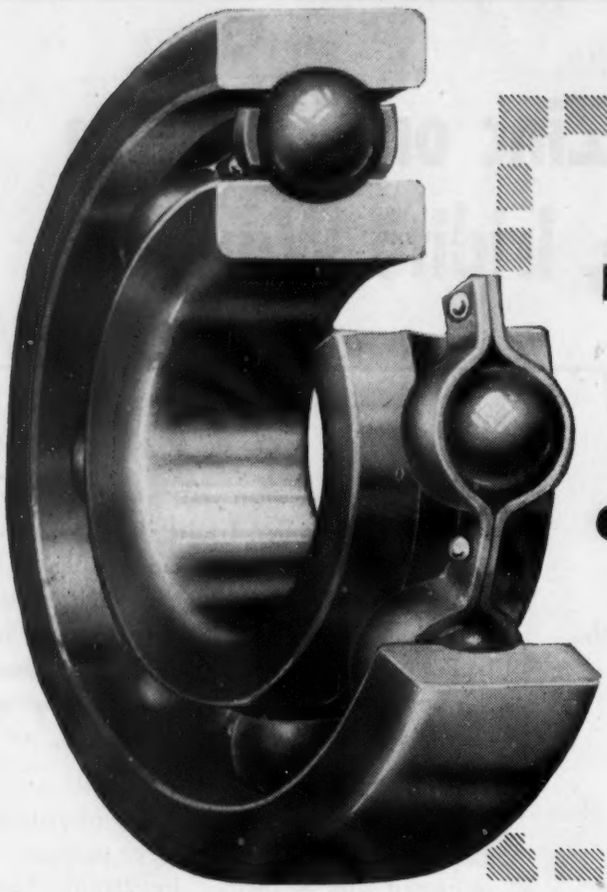
Name.....

Company.....

Address.....

.....

Keep faith with your fighters and yourself — Buy War Bonds for Keeps

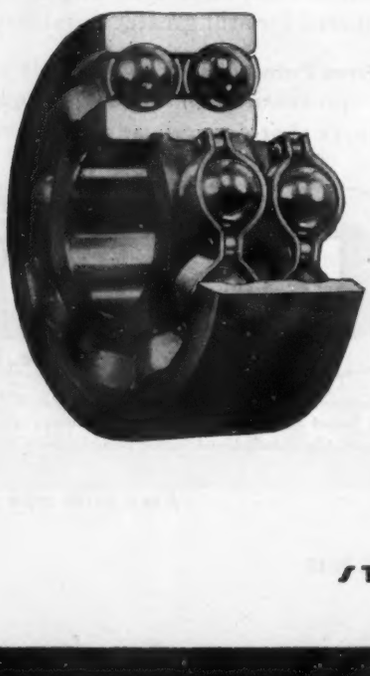


HOW MUCH DO THE *Bearings* COST THE *Designer?*

LEADING designers with reputations to guard . . . their own as well as their company's . . . carefully consider the bearings *when designing the equipment.* They know that properly selected bearings mean increased customer satisfaction for equipment makers . . . improved performance for equipment users. Carelessly selected bearings can cost a designer his reputation . . . the right bearings can improve his position by boosting his company's repeat sales.

BCA Ball Bearings are accurately engineered for varying speeds and loads . . . sturdily constructed for long life. Equipment makers can rely on them to promote equipment efficiency . . . and equipment users can be sure that they will require minimum maintenance. BCA engineers will gladly help you select the right bearings for present and future applications.

BEARINGS COMPANY OF AMERICA · LANCASTER, PENNA.



BCA

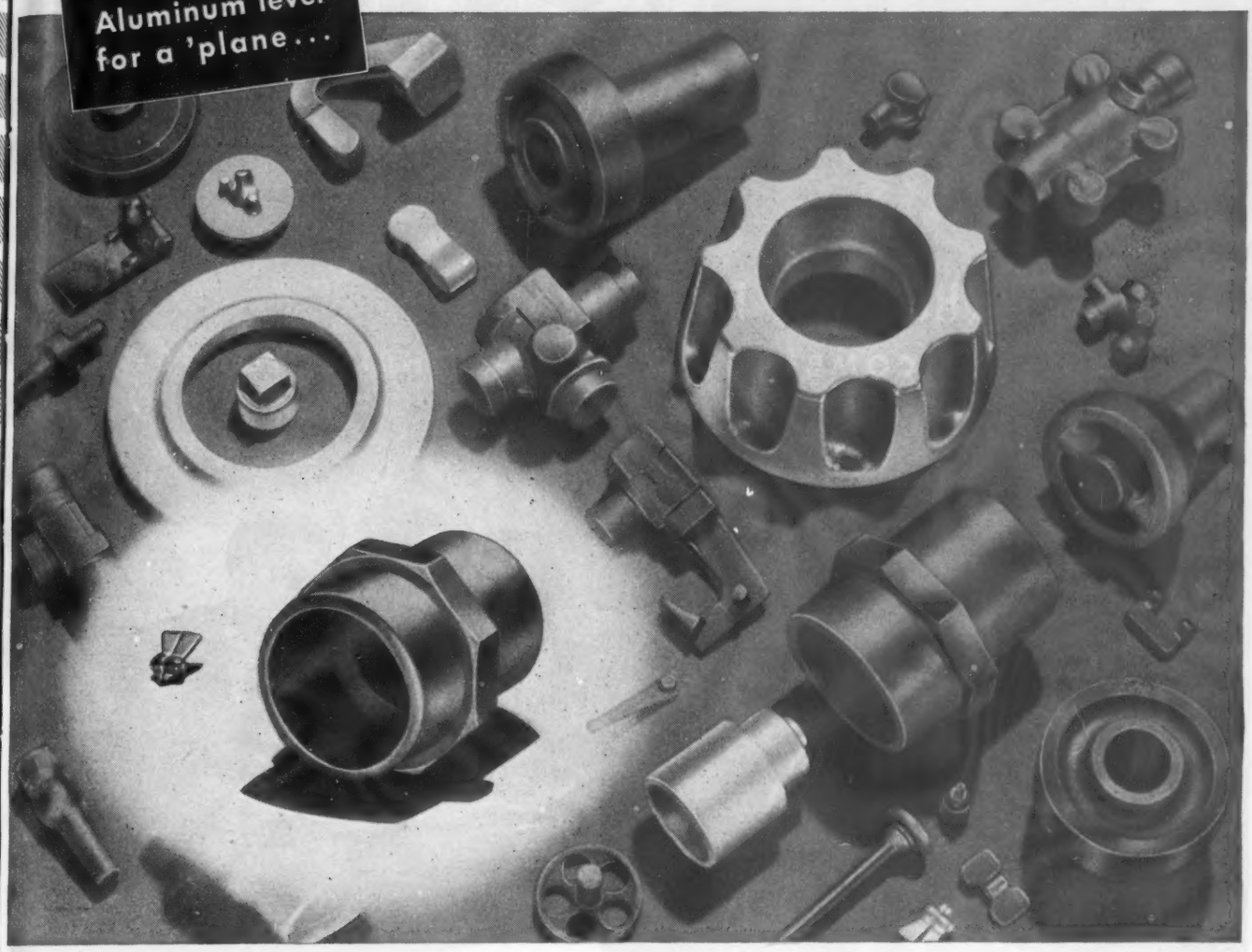
RADIAL · ANGULAR CONTACT · THRUST

BALL BEARINGS

Brass coupling for a hose...
Aluminum lever for a 'plane...

SCOVILL FORGINGS

for strength, uniformity, economy



Couplings for fuel oil and gasoline hoses must absorb a lot of wrench abuse. So Scovill *forges* them of brass to give them the kind of toughness only forging provides. And by ingeniously forging them without webs on the inside, Scovill saves weight on the couplings and reduces scrap.

Tiny levers for an aircraft application must be dense and uniform so that the ten thousandth piece will be as safe and dependable as the first. So Scovill *forges* them of aluminum... two levers in the same die...and saws the forging in half for more economical production.

When Scovill's ingenious designing, expert die-making, knowledge of metal behavior, diversity of metal-working facilities and years of experience are focused on a problem in metal parts, they invariably arrive at the *one* best answer. That's why records of Scovill production for more than 3000 firms show that Scovill usually produces metal parts better at the same price or equally good at lower cost.

Remember—Scovill works in all metals with such processes as forging, drawing, stamping, casting, pressing and finishing ...and therefore can honestly recommend the one best process for solving your problems in metal parts production. For proof of Scovill's ability, fill in the coupon below and get the free booklet *"Masters of Metal"*.

Scovill
MANUFACTURING COMPANY
WATERBURY 91, CONN.

Please send me a free copy of *"Masters of Metal"* booklet describing your facilities. I am interested in the metal forgings applications checked.

☐ Valves, Torch Heads, Regulators, for compressed gas cylinders, Welding and Blow Torches, etc. ☐ Household Appliance Parts ☐ Plumbing Goods (valves, etc.) ☐ Industrial Instrument Parts ☐ Aircraft Parts ☐ Communications Equipment Parts ☐ General Electrical Product Parts ☐ Fire Extinguishers ☐ Cameras ☐ Oil Burners ☐ Band Instruments

Other applications.....

SCOVILL MANUFACTURING COMPANY

Forgings Division
20 Mill Street, Waterbury 91, Connecticut

Name .....

Company .....

Address .....

THE "ONE BEST" WAY

TO COMBINE RADIAL AND THRUST LOADS...

Soon, very soon, equipment users are going to refuse to buy "just anything" they can get. During and after reconversion, they're going to pick and choose . . . to demand higher performance levels and lower maintenance costs. Bearings will be basic in new equipment specifications.

That's when Rollway solid-cylindrical Roller Bearings will count high in closing orders. Because Rollway right-angle loading is *"the one best way"* to combine radial and thrust loads . . . the way that reduces unit pressures and cuts down-time for bearing service and replacement.

ROLLWAY BEARING CO., INC.
Syracuse 4, N. Y.
since 1908 makers of

Splits the Load . . .
and Saves the Bearing

Rollway right-angle loading splits compound loads into the two components of *pure radial* and *pure thrust*. It carries each of these components on separate bearing assemblies, at right angles to the roller axis. No oblique loads or load resultants, no compound loads of any form, can bear on either the radial or thrust rollers. Unit pressures are lower. Total load magnitudes per bearing are held within calculated limits. Maintenance and replacement costs are substantially reduced. Send a drawing, or detailed description for free bearing analysis and recommendation by our bearing specialists. No obligation.

ROLLWAY CYLINDRICAL ROLLER BEARINGS

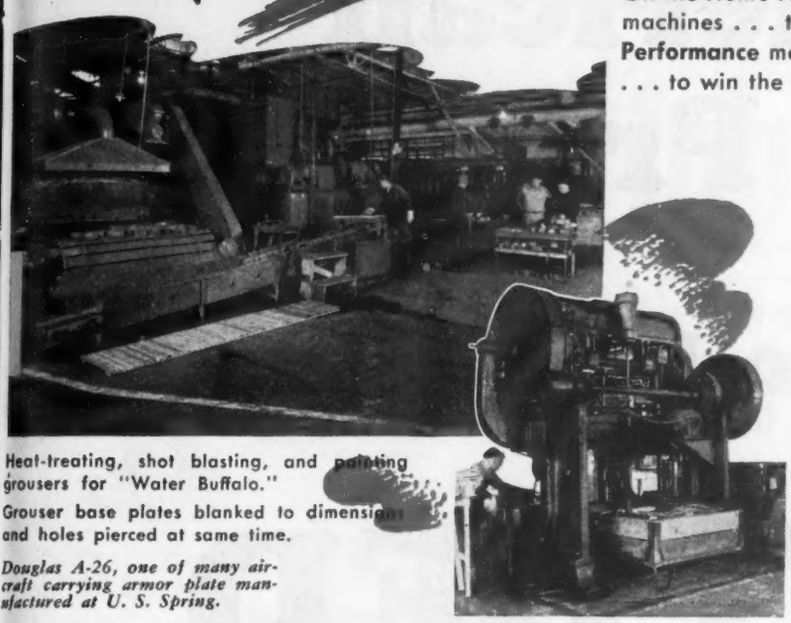
SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Tulsa • Los Angeles

Performance FACES TWO FRONTS!

On the Home Front — **Performance** means men and women using machines . . . to make the tools of war. On the Battle Fronts — **Performance** means these tools in the hands of our fighting men . . . to win the war.

The production of armor plate for aircraft, tanks, tank retrievers, and gun mounts; track chains for the "Water Buffalo"; springs for tank retrievers, Half-Tracks, and Army Jeeps has been entrusted to the men and women at U. S. Spring. Because of the faithful and efficient efforts in the production of these vital tools of war, our men and women have been granted the third Army-Navy Production Award.

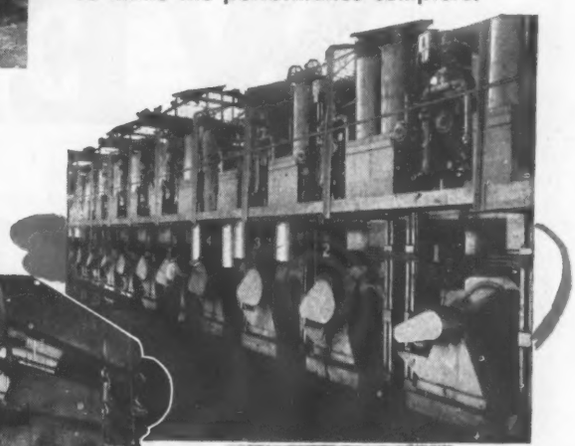
In accepting this Award, all of us at U. S. Spring acknowledge the responsibility — and pledge continued production performance until the men on the Fighting Fronts are able to make the performance complete.



Heat-treating, shot blasting, and painting grousers for "Water Buffalo."

Grouser base plates blanked to dimensions and holes pierced at same time.

Douglas A-26, one of many aircraft carrying armor plate manufactured at U. S. Spring.



Control end, car-type hot air recirculating tempering furnace used in heat-treatment of heavy armor plate.

Armor plate straightened on 300-ton press.

Army Jeep springs manufactured by U. S. Spring.

3rd ARMY-NAVY PRODUCTION AWARD FEBRUARY 3, 1945

U.S. PRODUCTS AS GOOD AS THEIR NAME — ARMY E NAVY

UNITED STATES SPRING & BUMPER COMPANY

Production Plant

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WELDED TUBES

UP TO 5½" O.D.; WALL THICKNESS UP TO 5/16"

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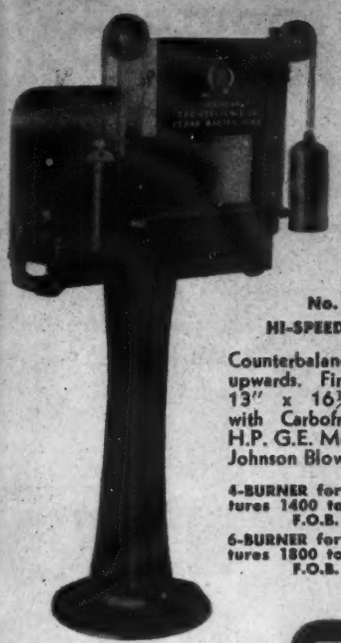
ONE TOOLROOM BOTTLENECK REDUCED 50% WITH QUICK *Acting* 70 Johnson *Furnaces*

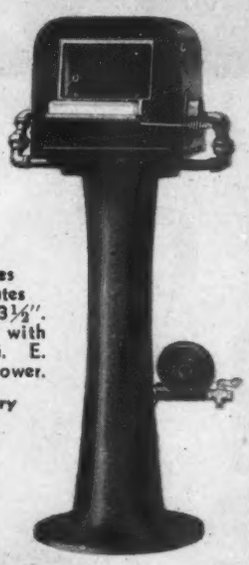


No. 130-A
HI-SPEED FURNACE

Counterbalanced door opens upwards. Firebox 7¾" x 13" x 16½". Equipped with Carbofrax hearth, ¼ H.P. G.E. Motor and Heavy Johnson Blower.

4-BURNER for temperatures 1400 to 2000°F. $295 F.O.B. Factory
6-BURNER for temperatures 1800 to 2400°F. $325 F.O.B. Factory

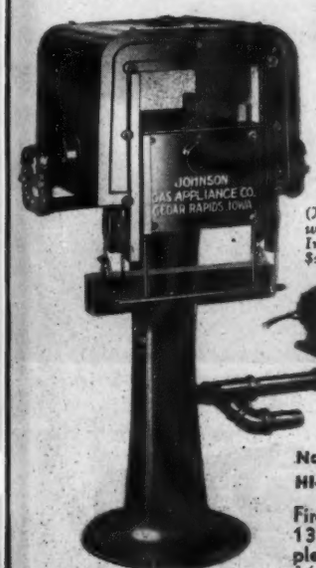
(No. 130-A currently equipped with 1-25 H.P. Motor and Improved Johnson Blower at $20 off factory list.)



No. 120
HI-SPEED FURNACE

1500° F. in 5 Minutes
2350° F. in 30 Minutes
Firebox 5" x 7¾" x 13½". Equipped complete with Carbofrax hearth, G. E. Motor and Johnson Blower.

$129.50 F.O.B. Factory



(No. 130 currently equipped with 1-25 H.P. Motor and Improved Johnson Blower at $20 off factory list.)

No. 130
HI-SPEED FURNACE

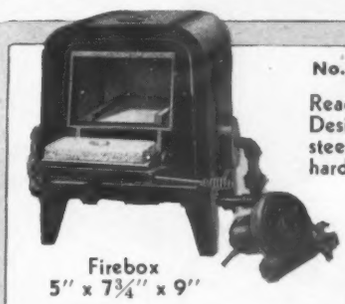
Firebox 5½" x 13" x 13½". Equipped complete with Carbofrax hearth, ¼ H.P. G.E. Motor and Heavy Johnson Blower. . .

$248 F.O.B. Factory

High-Speed Steel Tools and Dies Heat-Treated and Back Into Production BEFORE Conventional Furnace Heats Up!

JOHNSON offers a practical approach to machine shop efficiency through reduction of lost man and machine hours.

By concentrating heat where it is needed and insulating against loss with high temperature, high quality refractory, Johnson Furnaces reach operating temperatures faster to give **Quick Action** in clean heat-treating of high speed steels, cutting tools and dies . . . equally efficient for hardening carbon steels and small metal parts. Practically ready for operation, Johnson Units materially reduce "down-time" on machines waiting for tooling, **save man-hours and gas.** Select the units which meet your needs and order today to assure early delivery.



No. 70 HI-SPEED BENCH FURNACE

Reaches 2250° F. in 30 minutes. Designed primarily for hi-speed steels, it is equally efficient for hardening punches, dies, cutting tools and small parts. Equipped with Carbofrax hearth, G.E. Motor and Johnson Blower.

Firebox
5" x 7¾" x 9"

$89.50 F.O.B. Factory

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573 E Avenue N.W., Cedar Rapids, Iowa

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only Apex gives maximum strength and endurance with minimum wear!

Balanced design gives the Apex Heavy Duty Joint the following advantages: the highest strength (axial and torsional) weight ratio of any joint in its class; the highest resistance to vibration and fatigue failure; ability to withstand temporary torsional overloads as great as 80% of rated ultimates and temporary axial overloads up to 150% in excess of rated ultimates.

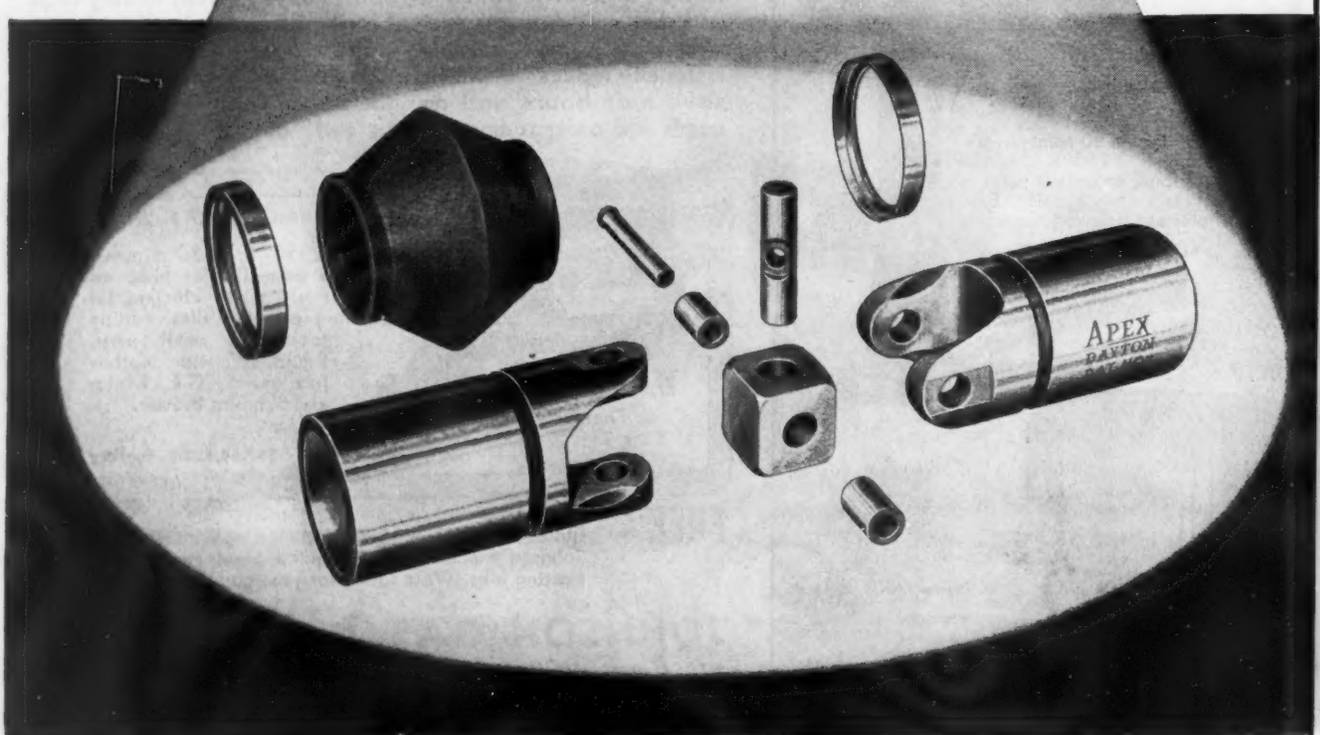
The exclusive, flexible Apex cover provides a unique "Winterization" method and multiplies joint life many times. This cover seals lubrication in, seals troubles out and is in full compliance with AAF Winterization directives.

For commercial applications this joint will reduce your maintenance costs over any other joint on the market.

Furnished in sizes from ½" to 1½ —with torque ratings up to 14,80 inch pounds—in all standard size or in specials engineered to you needs. *Write for Bulletin No. 10* **The Apex Machine & Tool Com pany, Dayton 2, Ohio.**

APEX

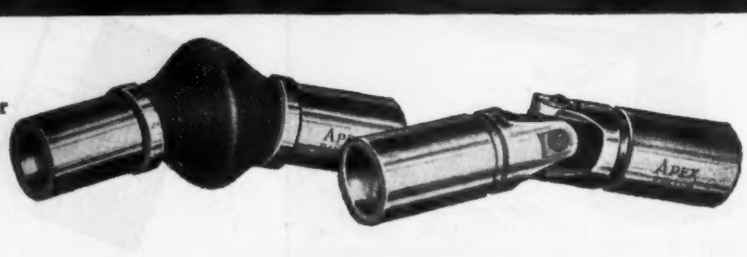
UNIVERSAL JOINT



APEX PATENT NUMBERS

Patent No. 2,264,727—Heavy Duty Design
Patent No. 2,264,728—Lubrication Retaining Cover
Patent No. 2,290,776—Lubrication Retaining Seal
Patent No. 2,302,272—Pinning Construction
Patent No. 2,369,810—Pinning Construction

Other Patents Pending



Weirzin offers you a real business advantage. It enables you to manufacture a definitely better product at an appreciably lower net cost.

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WEIRTON, W. VA.

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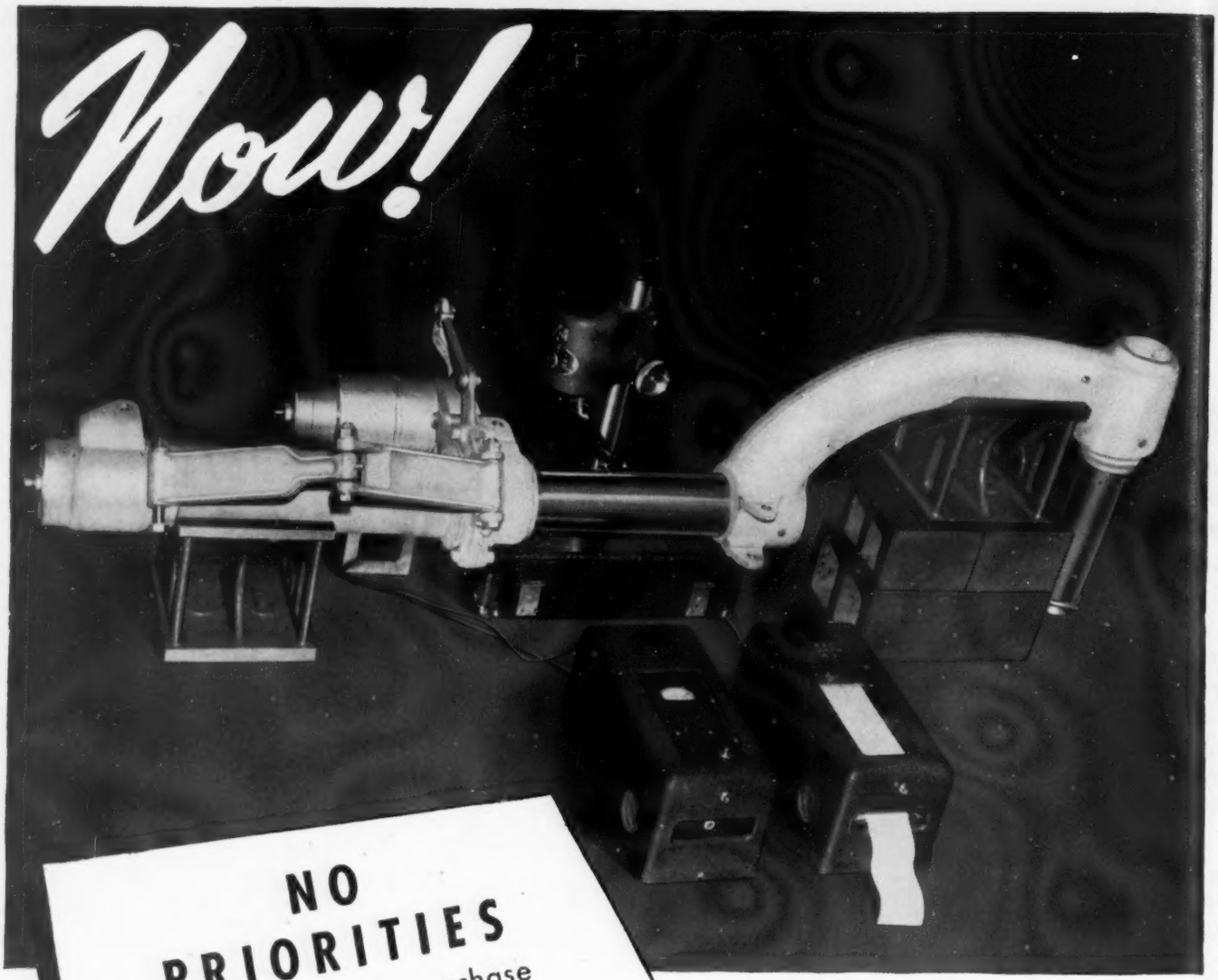

At the Willow Run Bomber Plant of the Ford Motor Company, the Brush Surface Analyzer determines the smoothness of oleo strut pistons.

NO PRIORITIES

are necessary to purchase a Brush Surface Analyzer . . . Approximately two week delivery on unrated orders . . .

THE BRUSH SURFACE ANALYZER

measures and records the irregularities as shallow as a millionth of an inch on steel . . glass . . plastics . . plated and painted surfaces.

Ask for a demonstration at your plant

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Custom tailor for a suit of armor

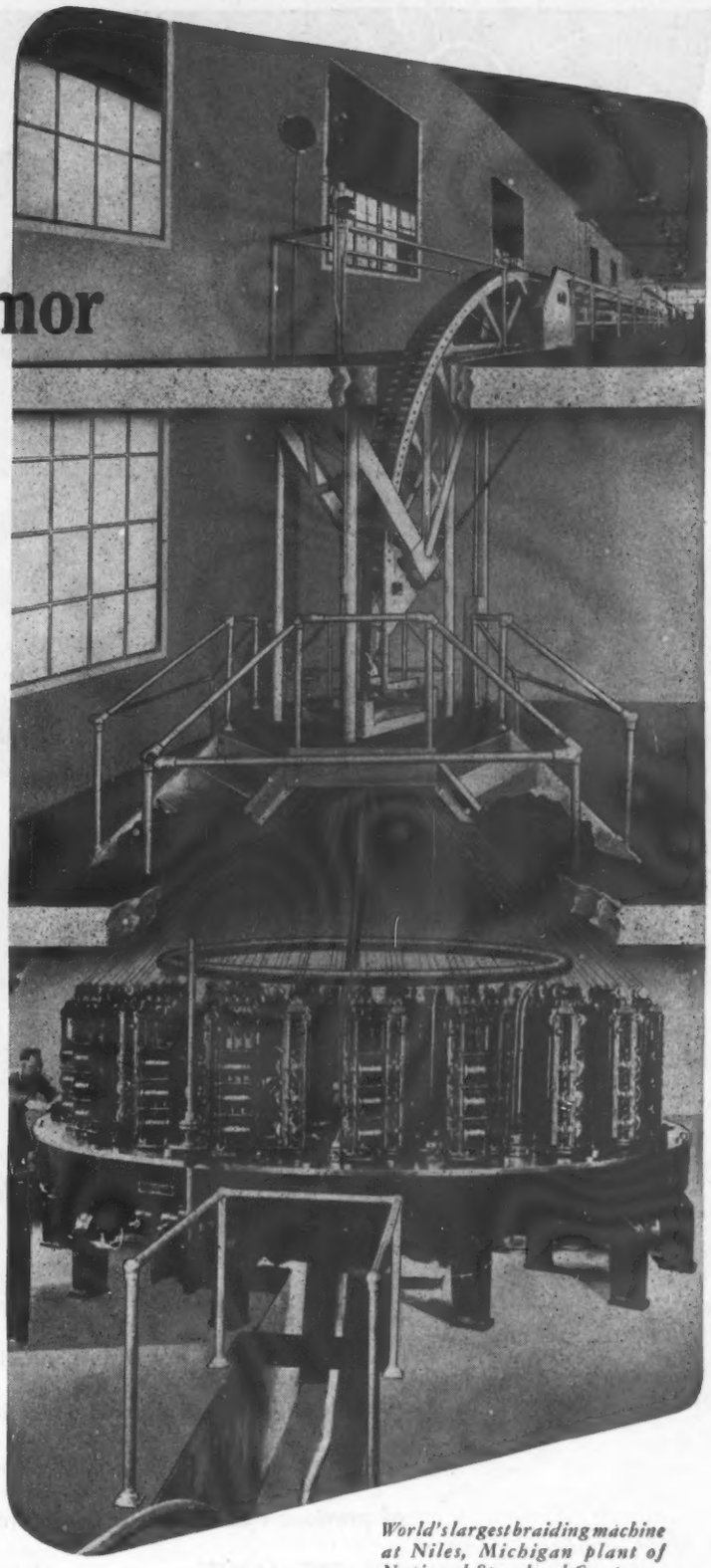
APPLYING wire braided armor or shielding to tubing, conduit or hose, is a custom tailoring job. Braiding can be applied directly to material to be covered, or the metal braid can be furnished in suitable lengths for the user to apply in his own plant during assembly operations.

To provide the desired flexibility and other characteristics such as uniform coverage, resistance to mechanical abuse, resistance to elongation, or enlargement of diameter, braiding wire must be applied at precisely the correct angle and there must be no variation from this . . . from start to finish of the job.

That's why for fine radio wire 1/16" in diameter, or 16" steam expansion joints, more and more companies are calling upon National-Standard for their wire braiding work. For, we at National-Standard have the knowledge and experience necessary to give you a custom tailored job of braiding to meet exactly your particular requirements.

Today at National-Standard we have machinery available to braid steel, brass, copper, stainless steel, and monel metal. Let our 38 years of experience in the wire and wire fabricating industry help *you* with your braiding problem.

BUY AND KEEP WAR BONDS AND STAMPS



World's largest braiding machine at Niles, Michigan plant of National-Standard Company.

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NATIONAL-STANDARD Company
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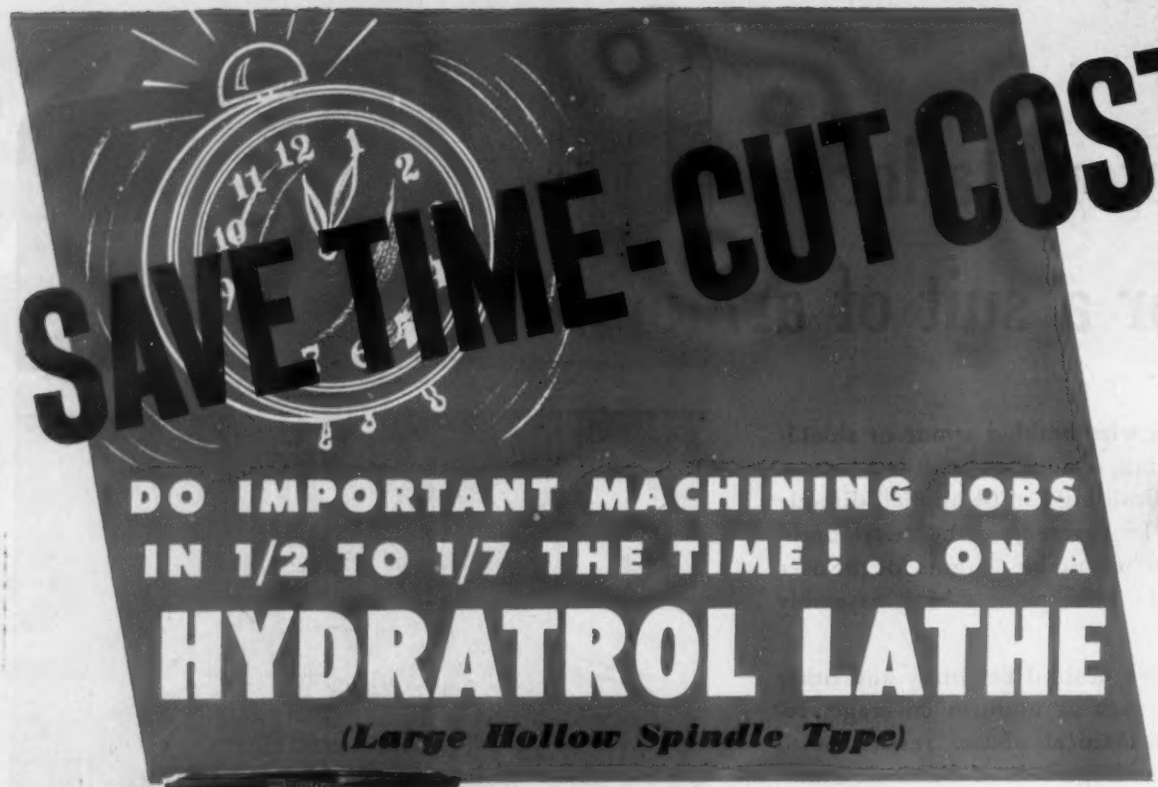
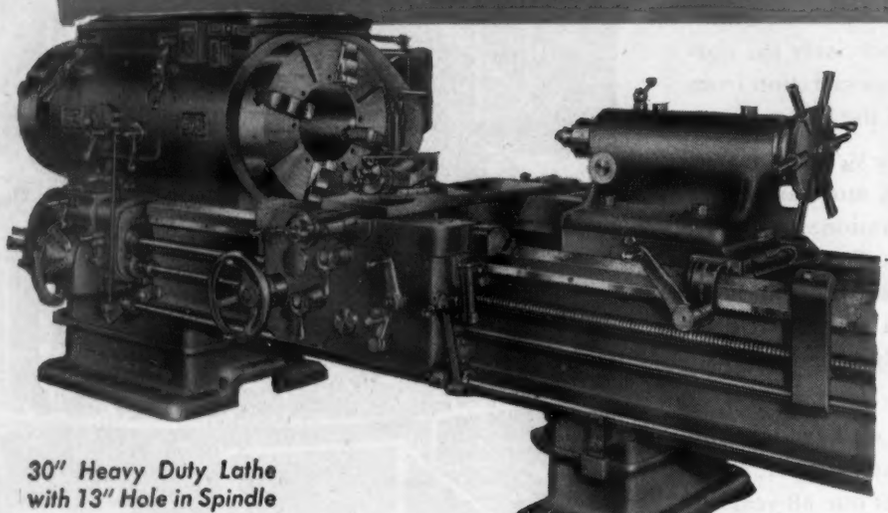




30" Heavy Duty Lathe with 13" Hole in Spindle

5 sizes-18" to 36"

Small, 18" up to 7-1/4" Hole
Medium, 24" up to 12" Hole
Large, 27" up to 13" Hole
Large, 30" up to 14" Hole
Large, 36" up to 16-1/2" Hole

(*Standard Type lathes, 16" to 36"*)

IN a number of big war plants, on HYDRATROL LATHES, important operations are being performed in 1/2 to 1/7 the time of previous operations. In one plant, HYDRATROL LATHES are saving 15,000 man hours per month!

Maybe YOU, too, can "do it better" on a HYDRATROL LATHE (Large Hollow Spindle Type). Maybe you, too, can achieve faster production, better work, lower costs. Why not let us show you what a HYDRATROL LATHE could do in your plant?

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND ★ ST. LOUIS 3, MISSOURI

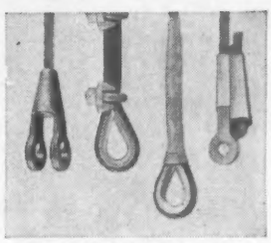
BEACH-HEAD BULL SESSION

"Tex" was formerly a driller in the oil fields; Oscar, a rigger in a logging camp; Joe, a dragline operator; and Bill, a shovel runner for a construction outfit. Now they, and thousands like them, are building bases 'round the world.

In a bull session they'll gripe about lots of things—but mention *pre*formed wire rope and they change their tune. Back home, in scores of industries, they learned an affectionate respect for its dependability. And on foreign soil, with supplies hard to get and time at a premium, stout wire rope is doubly vital.

WISSCOLAY *Pre*formed Wire Rope, manufactured by Wickwire Spencer, not only lasts longer, but it's easier to cut, splice and install —safer to handle. Using it saves money, man hours and critical material. Wisscolay *Pre*formed, like regular Wickwire Rope, is made in all sizes and constructions.

If you have a wire rope question our wire rope engineers will be glad to be of service. Call or write our nearest branch office or Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, New York.



WHICH ATTACHMENT IS BEST?

The proper types of attachments and applications are two of the many useful ideas you'll find in "Know Your Ropes." This 82-page book contains 78 "right and wrong" illustrations, 40 wire rope life savers, 20 diagrams, tables, graphs and charts. It can help make your present wire rope last longer.

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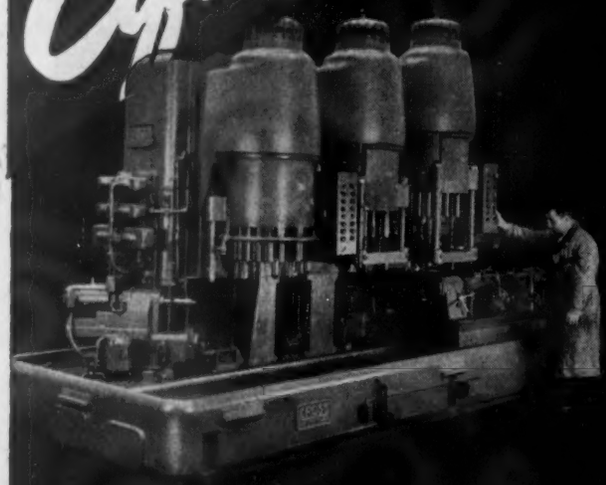
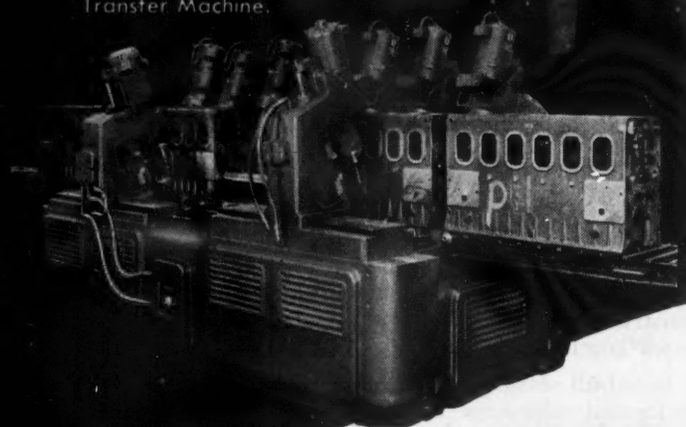
Equip for the Job!

MILLING cylindrical, conical or flanged work externally or internally.

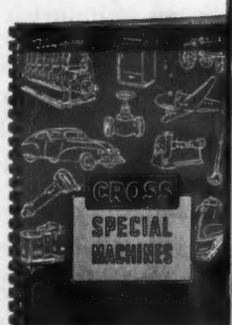


DRILLING and TAPPING five holes simultaneously in cylinder blocks with Cross Automatic Transfer Machine.

DRILLING, COUNTERSINKING and TAPPING the assembly holes in the bowl face of truck axle housings on Cross 3-Station Automatic Transfer Machine.



MILLING with both sides of a cutter in finishing two aircraft crankcases simultaneously.



Send for **the new Cross Catalog which contains 35 detailed case histories of successful Cross *Special Machines*. For your copy, write on your letterhead to The Cross Company, Detroit 7, Michigan, Department 124.**

CROSS

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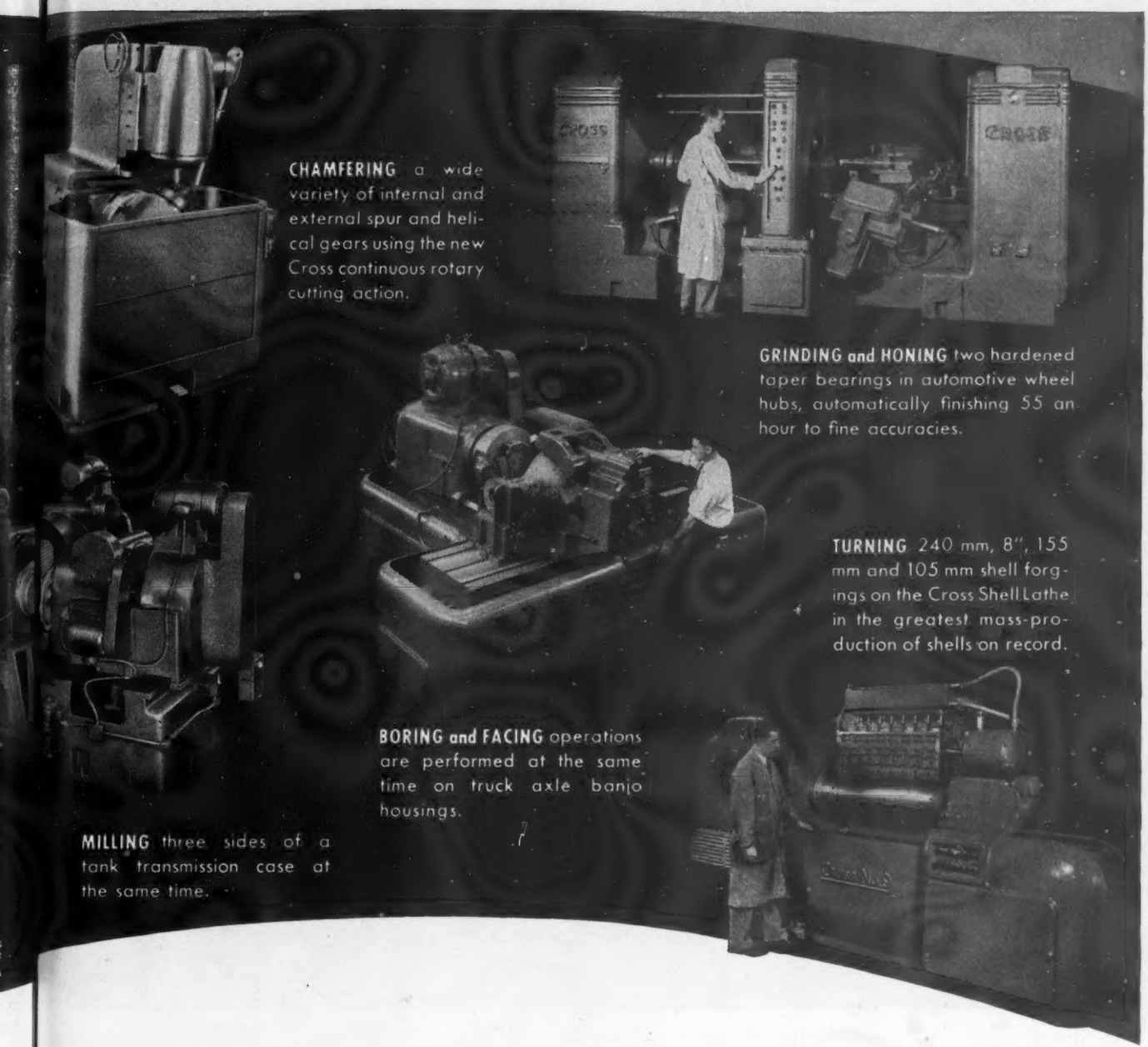

CHAMFERING a wide variety of internal and external spur and helical gears using the new Cross continuous rotary cutting action.
GRINDING and HONING two hardened taper bearings in automotive wheel hubs, automatically finishing 55 an hour to fine accuracies.
TURNING 240 mm, 8", 155 mm and 105 mm shell forgings on the Cross Shell Lathe in the greatest mass-production of shells on record.
BORING and FACING operations are performed at the same time on truck axle banjo housings.
MILLING three sides of a tank transmission case at the same time.

Dollars invested in Cross Machine Tools deliver maximum performance *with maximum profit.* Each machine is individually engineered and custom built *to suit the work*—capacity, production, horse-power, handling facilities, floor space, perishable tool and price factors are carefully balanced and brought into focus on the ultimate function: production for profit.

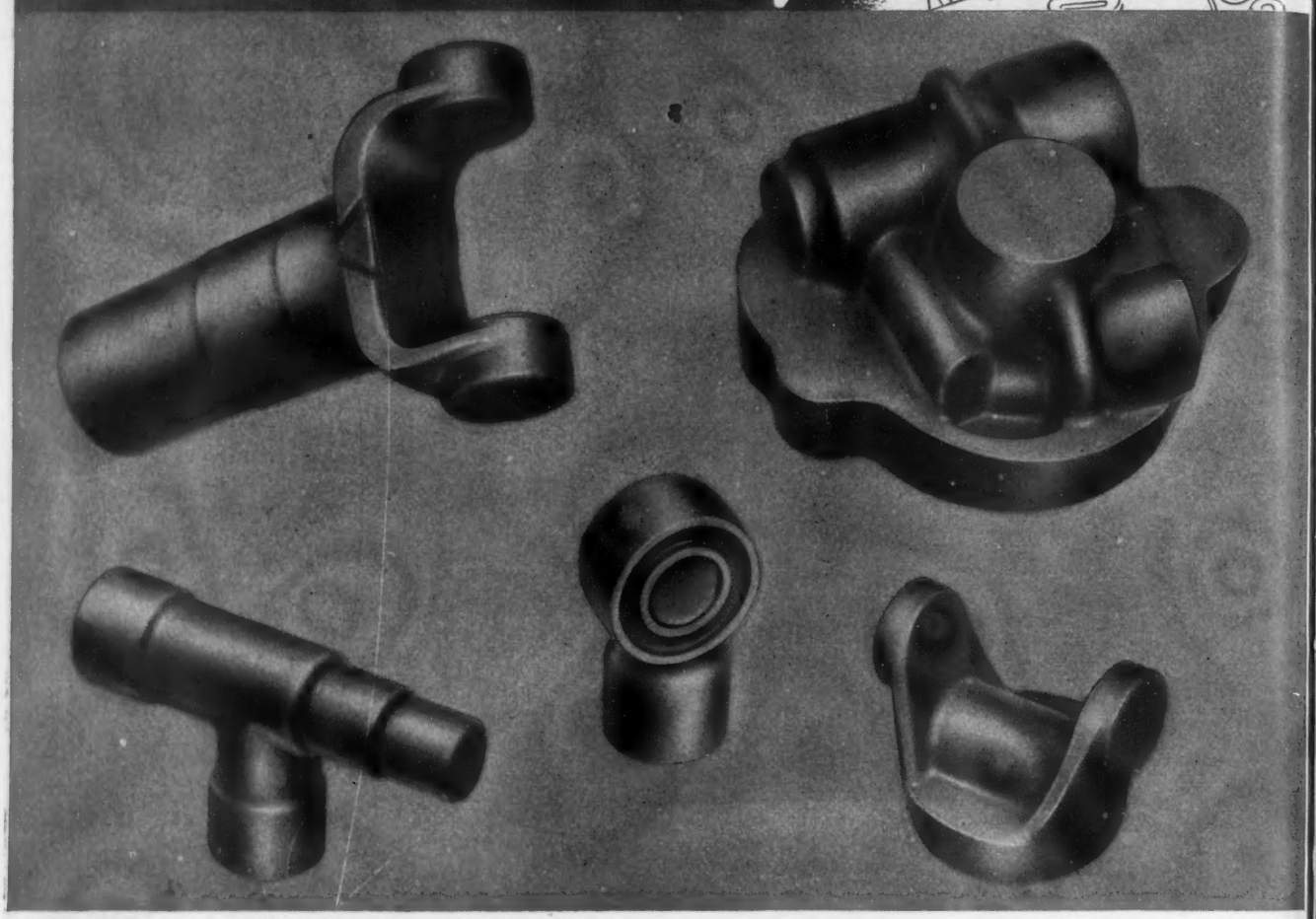
Forward looking manufacturing executives are utilizing the services of Cross Engineers to *equip for the job.* Hunting a job to suit general purpose equipment compromises the profit dollar.

S-19

SPECIAL MACHINES

for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

Want to make it better?



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Do you want to add strength and stamina to your product . . . increase its useful life . . . improve its efficiency and dependability? Do you want to simplify its manufacture . . . and reduce its cost?

In hundreds of different products, Forgings by Phoenix have made those very things possible . . . provided extra strength where strength is needed . . . reduced weight by making possible lighter sectional thicknesses without sacrificing heavy-duty ruggedness . . . reduced manufacturing costs by cutting machining time and providing improved welding adaptability.

In planning your postwar product you'll find it to your advantage to consider the use of Forgings by Phoenix. Let's talk it over . . . now or any time you say.

FORGING DIVISION OF
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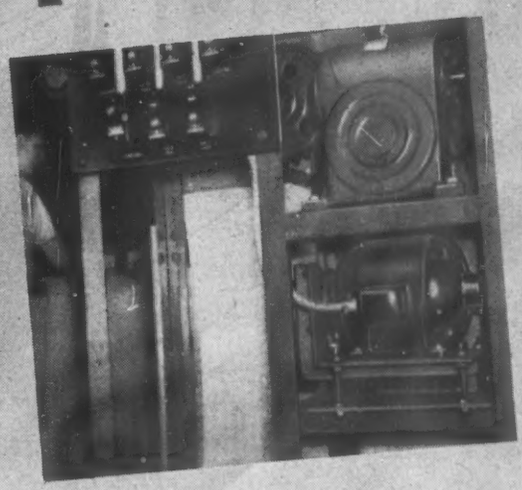
CATASAUQUA, PA. JOLIET, ILLINOIS

Forgings by **PHOENIX**

IN STUFFY SPOTS

Many a motor must be located where walls, adjacent equipment, or materials cut down the free flow of air. Sometimes, as in the case of this wool-dryer drive, surroundings are hot, and stuffy, too.

Tri-Clad motors have proved themselves cool-running even under such conditions. Their powerful, double-end ventilating system moves the air at controlled velocity for effective heat removal. The location and baffling of dual exhaust ports discourage recirculation.



Tri-Clad motor drives conveyor on wool dryer—Bigelow Sanford Carpet Co., Amsterdam, N. Y.

AIR-FLOW TESTS OF TRI-CLAD MOTORS LEAD TO PROTECTION FROM OVERHEATING

Plenum chamber test of Tri-Clad motor ventilation at G-E motor factory.

Before new types or sizes of Tri-Clad motors are approved for production, plenum chamber tests are conducted on the ventilating systems of sample models. These measurements serve as a check on previous calculations of the volume and velocity of air through the motor under different conditions. Other tests under load within enclosures and at abnormal ambient temperatures are also made. If your motors must be confined in stuffy spots, G.E. can help you make the right choice to beat the heat. *General Electric Company, Schenectady 5, N. Y.*

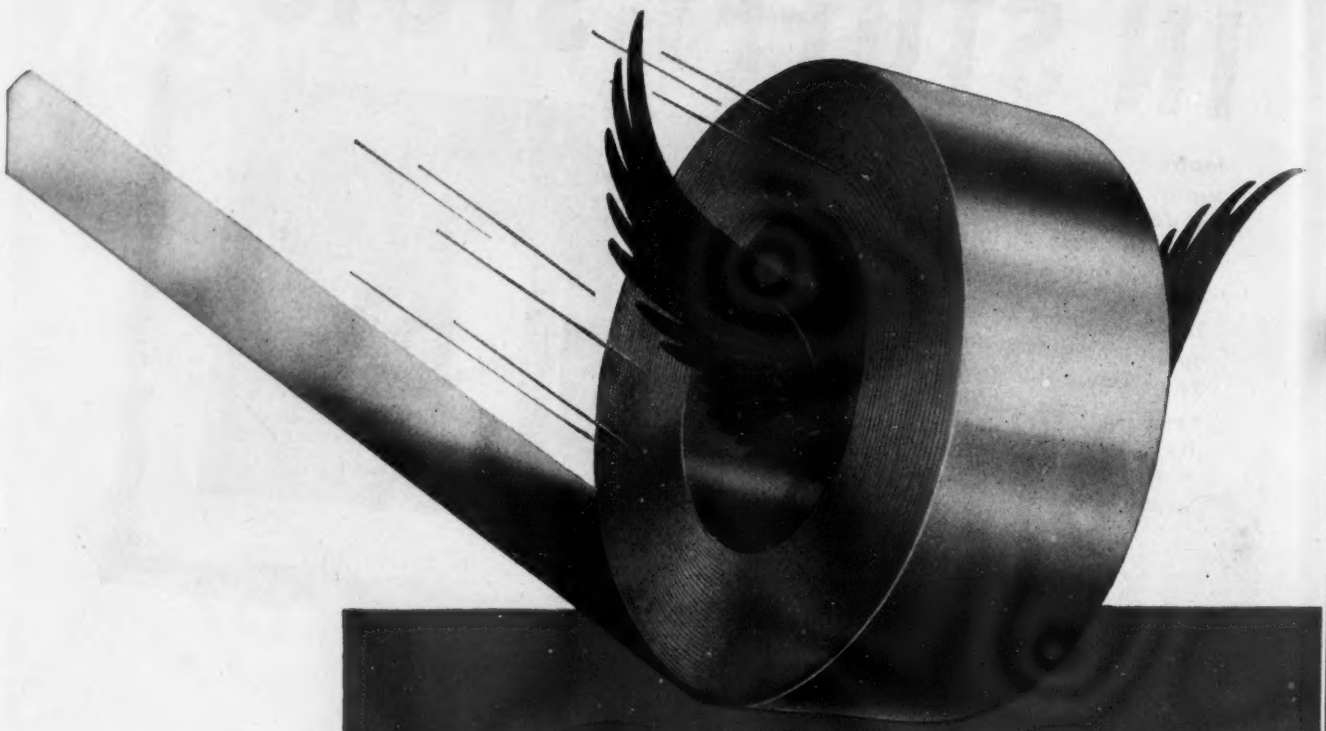
GENERAL ELECTRIC

750-255-8030

TRI-CLAD MOTORS

Buy all the BONDS you can—*and keep all you buy*

Follansbee



for *Excellent Service* on COLD ROLLED STRIP

When you're in a hurry for Cold Rolled Strip—and can't risk the sacrifice of quality—Follansbee is a supplier which deserves your attention. For, even with production schedules crowded, Follansbee can frequently arrange shifts which permit the handling of additional orders to meet your emergencies.

This flexibility is of particular advantage when exacting specifications must be met. Under any conditions, Follansbee Cold Rolled Strip is produced to the precise temper, gauge, width and finish required.

Any time you'd like to put Follansbee to the test—on Cold Rolled Strip or other steels—you're invited to write, wire or telephone the Follansbee General Offices, or the nearest Follansbee Sales Office or Agency.

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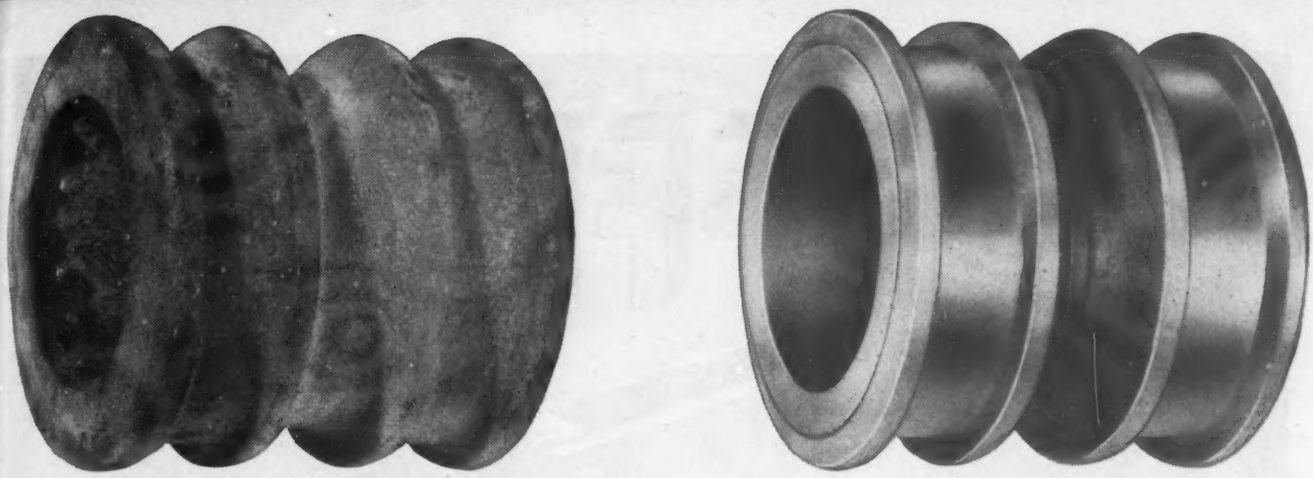
GENERAL OFFICES • PITTSBURGH 30, PA.

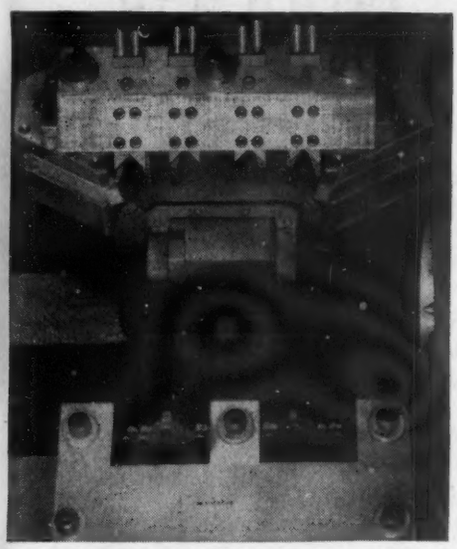
Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, Houston, St. Louis, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada. *Plants*—Follansbee, W. Va. and Toronto, O.

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • CLAD METALS • COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING



FROM THIS . . . . . TO THIS

IN 4 MINUTES (Floor to Floor Time)

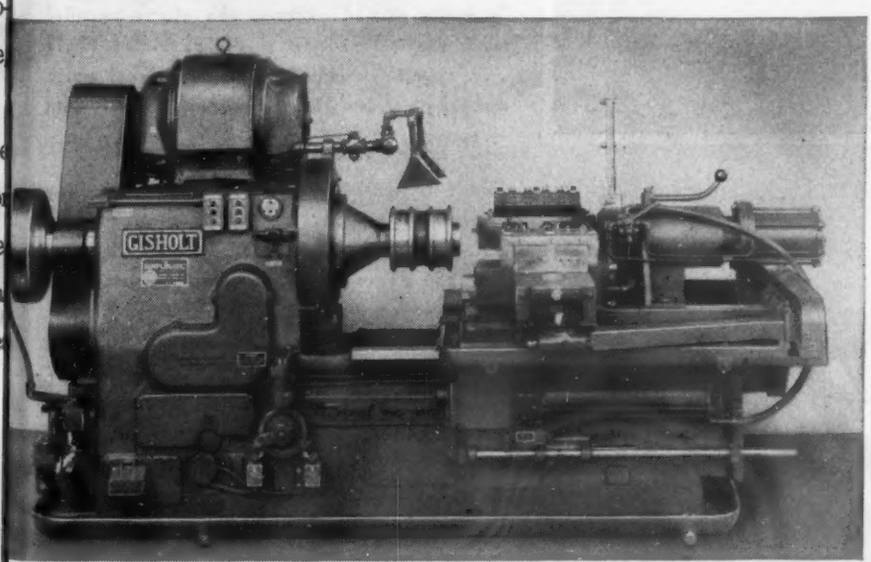


Here's another good example of the way a large number of surfaces can be machined at one time. Gisholt's versatile design permits many variations with two or more heavy duty slides, each with its own drive, its own rate and direction of feed. Yet, all are driven from and accurately timed with the spindle.

These track rollers are machined with 24 carbide tipped tools on 3 slides. Actual cutting time is 2½ minutes using over 40 H.P. Loading, unloading, etc., require 1½ minutes. Total time, floor to floor: 4 minutes.

THE GISHOLT SIMPLIMATIC

The machine shown here is equipped with an expanding arbor operated by a 16″ air cylinder; has a tailstock and three tool slides. It is tooled to machine two sizes of two different types of track rollers. All machine functions are automatic, operated by a single control. An operator can normally tend several Simplimatics. If large volume, low cost machining interests you, write for information about Gisholt Automatic Lathes.



GISHOLT MACHINE COMPANY
1217 East Washington Avenue
MADISON 3, WISCONSIN

Look Ahead... Keep Ahead... With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

JEFFREY CHAINS
IN THE STEEL MILLS

HOT STRIP TRANSFER

To make parallel transfer of long, continuously rolled strips . . . to deposit these strips accurately on other roller tables for straight, down-the-line movement . . . requires chains of accurate pitch alignment and precision manufacture.

Jeffrey Transfer or Cooling Bed Chains possess characteristics that meet these precision demands. They have . . . proper fit for positive articulation of the tilting and ducking spurs . . . accurate pitch alignment in every strand to keep the strips parallel with the center line of the receiving table . . . specific treatments of component parts for long service life and retention of original accuracy.

"Built-in" quality is characteristic of Jeffrey chains. Try them on your pallet conveyors . . . feeder and catcher tables . . . crop and coil conveyors . . . sheet pilers . . . and other conveyor applications.

Jeffrey

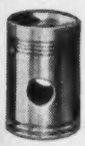
THE JEFFREY MANUFACTURING CO.
ESTABLISHED 1877
889-99 N. FOURTH STREET
COLUMBUS 16, OHIO

Design that part in ArmaSteel*

The metal that boosts output, cuts costs, saves time, when "GO-Day" comes

IN THE AUTOMOTIVE AND DIESEL INDUSTRIES

PISTONS



A leading Diesel manufacturer has used ArmaSteel pistons for years, chalking up impressive records of continuous service.

GEARS

Faster gear production through casting closer to finished dimensions and easier machining is a leading advantage of ArmaSteel.

CLUTCH THROWOUT COLLARS

The special qualities of ArmaSteel well fit it for the heavy loads and wear to which throwout collars are subjected.

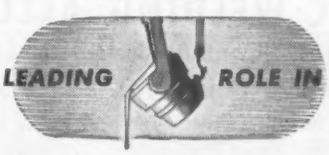
The time lag from plan board to finished product can be cut sharply with ArmaSteel, the metal that has proved its mettle in hundreds of strategic war uses. In your reconversion plans consider these factors:

1. ArmaSteel is cast to conform closely to final shapes, cutting machining time, lowering cost of manufacture and reducing scrap loss.
2. ArmaSteel is much easier to machine than steel bar stock and forgings of the same Brinell hardness.
3. ArmaSteel has a uniform structure and a high yield ratio, with good fatigue and wear properties.
4. ArmaSteel responds to selective hardening by any of the commercial processes, such as induction, flame-hardening or bath immersion.
5. ArmaSteel maintains its properties at sub-zero temperatures.
6. ArmaSteel may be machined and polished to the mirror finishes so necessary to reduce friction.
7. ArmaSteel can be cast to combine several parts in one integral casting, thereby reducing machining and assembly costs.
8. ArmaSteel can be heat-treated to cover a wide range of physical properties.

Leading manufacturers have proved ArmaSteel to be an exceptionally versatile material, adaptable to varied requirements and lending itself to time-saving techniques.

Investigate ArmaSteel. It may effect savings and improvements in your product. Write us, detailing your requirements. Specify ArmaSteel in your reconversion plans.

BUY ANOTHER WAR BOND FIRST

CAST FOR A LEADING  *ROLE IN INDUSTRY*

SAGINAW MALLEABLE IRON DIVISION OF GENERAL MOTORS

SAGINAW, MICHIGAN

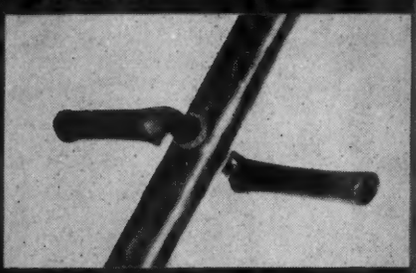
*Reg. U. S. Pat. Off.

Make 6-Ways Better Welds with EUTECTIC

(Pronounced U-TEC-TIC) Reg. U. S. Pat. Off.

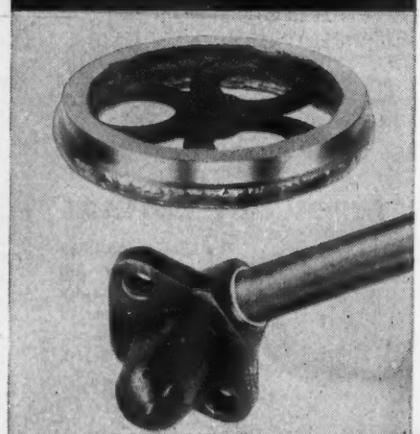
Low Temperature WELDING RODS

EXTRA SMOOTHNESS is demonstrated in this Cast Iron lug built up with EutecRod 14.



UNUSUAL STRENGTH is proved by twist test of Chrome Moly steel tube welded with EutecRod 16.

PERFECT COLOR MATCH of the weld was obtained in this Bronze casting built up with EutecRod 18.



(Above) EASY MACHINING to a smooth finish is demonstrated on this Cast Iron wheel resurfaced with BRONZOCHROM rod 185.
(Below) COPPER TUBE and bronze fitting welded with EutecRod 1800 required no after machining because of smooth fillet formed.

EUTECTIC welds are: SMOOTHER • STRONGER • BETTER COLOR MATCHED • MORE MACHINABLE • FASTER TO MAKE and REQUIRE LESS HEAT, avoiding distortion, stresses and overheating

No other welding or brazing process affords welders such a combination of advantages at such low bonding temperatures (as low as 340°F) and little heat consumption.

EUTECTIC *Low Temperature* Welding, the most revolutionary welding development of modern times, enables you to weld joints at temperatures *below the fusion points of base metals*—eliminating the many hazards of high temperature fusion welding.

All metals can be joined by the EUTECTIC process. No special skill is required . . . no extensive training needed. All standard methods of heating are employed: Gas—Arc—Furnace and others in combination with the new EUTECTIC Welding Rods and Fluxes.

If you have Oxy-Acetylene or Arc Welding equipment all you need is an assortment of Eutectic Rods in order to add this important improvement to your equipment. Get the facts today! Fill in the coupon at once for full information.

Castolin Eutectic

EUTECTIC WELDING ALLOYS COMPANY

Originators of Eutectic *Low Temperature* Welding

40 Worth Street, New York 13, New York Room 1109-E

Please send me full information for purchasing an introductory assortment of important Eutecrods for Production . . . Salvage and Maintenance welding.

Name_____

Company_____ Position_____

Address_____ City_____

Trigger Fingers . . .

Fighting for their country, millions of men from every walk of life are learning the value of good mechanisms . . . and the springs that help to make them work. Their trained hands will be quick to judge the worth of the products of the future. Their influence will affect mechanical developments in many fields. For those men who will improve, invent, pioneer the products of a country again at peace, the Wallace Barnes Company offers the resources of an organization trained to design and produce good springs in their infinite variety.

CONSERVE METAL — DESIGN WISELY

1918 — THEN

AND NOW

ARMY E NAVY

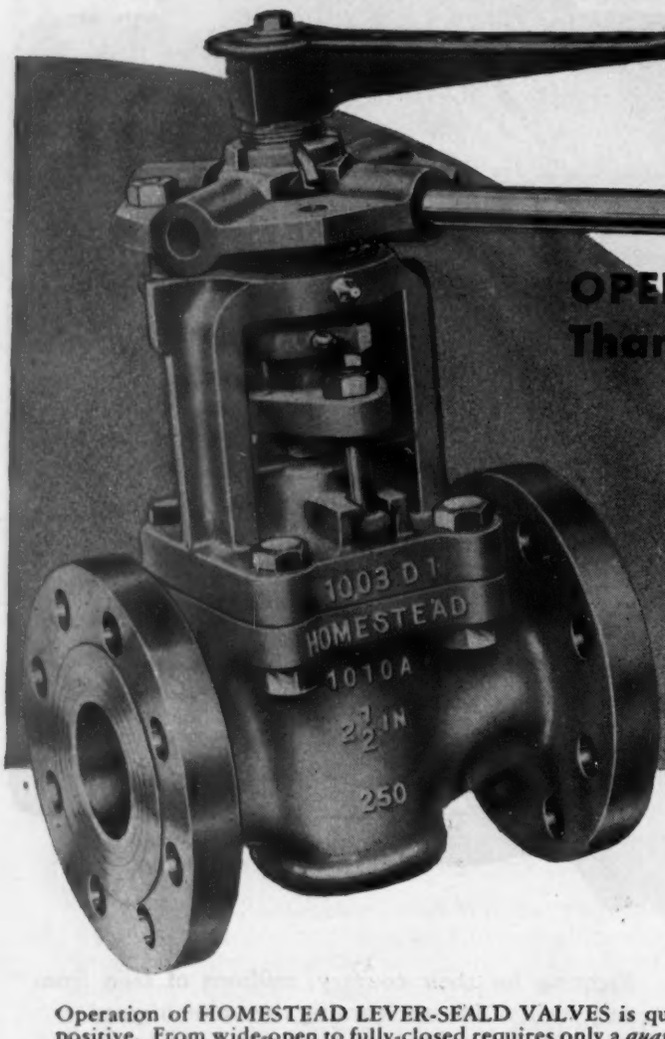
Barnes-made Springs

ENGINEERED PEP AND POWER

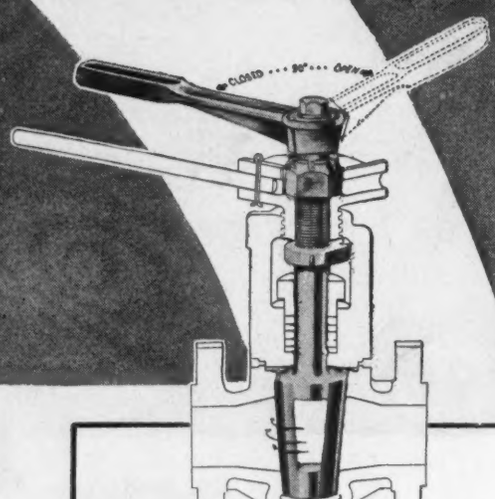
WALLACE BARNES COMPANY DIVISION OF ASSOCIATED SPRING CORPORATION BRISTOL, CONNECTICUT, U. S. A.

Quick Action Every Time

with Homestead Lever-Seald Valves



OPERATE 16 to 28 TIMES FASTER Than Screw-Stem Type Valves



Operation of HOMESTEAD LEVER-SEALD VALVES is quick and positive. From wide-open to fully-closed requires only a *quarter-turn* of the upper lever—and that's 16 to 28 times faster operation than the 6 to 7 full turns required by screw-stem-type valves. Not only do HOMESTEAD LEVER-SEALD VALVES operate quickly, but they are built to operate under all conditions; for built right into every valve is a powerful lever and screw device which relieves seating pressure between the plug and body just enough to overcome friction and permit easy turning. For fast, positive, labor-saving operation, they can't be beat! And the small space required by the Quarter-Turn, permits their use where other valves could not be operated.

HOMESTEAD LEVER-SEALD VALVES are made in combinations of metals and alloys to meet your service requirements, in sizes 1½" to 10", for pressure ranges from 150 pounds to 1500 pounds. Special valves may be designed to meet your specific requirements. Write *now* for Valve Reference Book No. 38.

6 Reasons

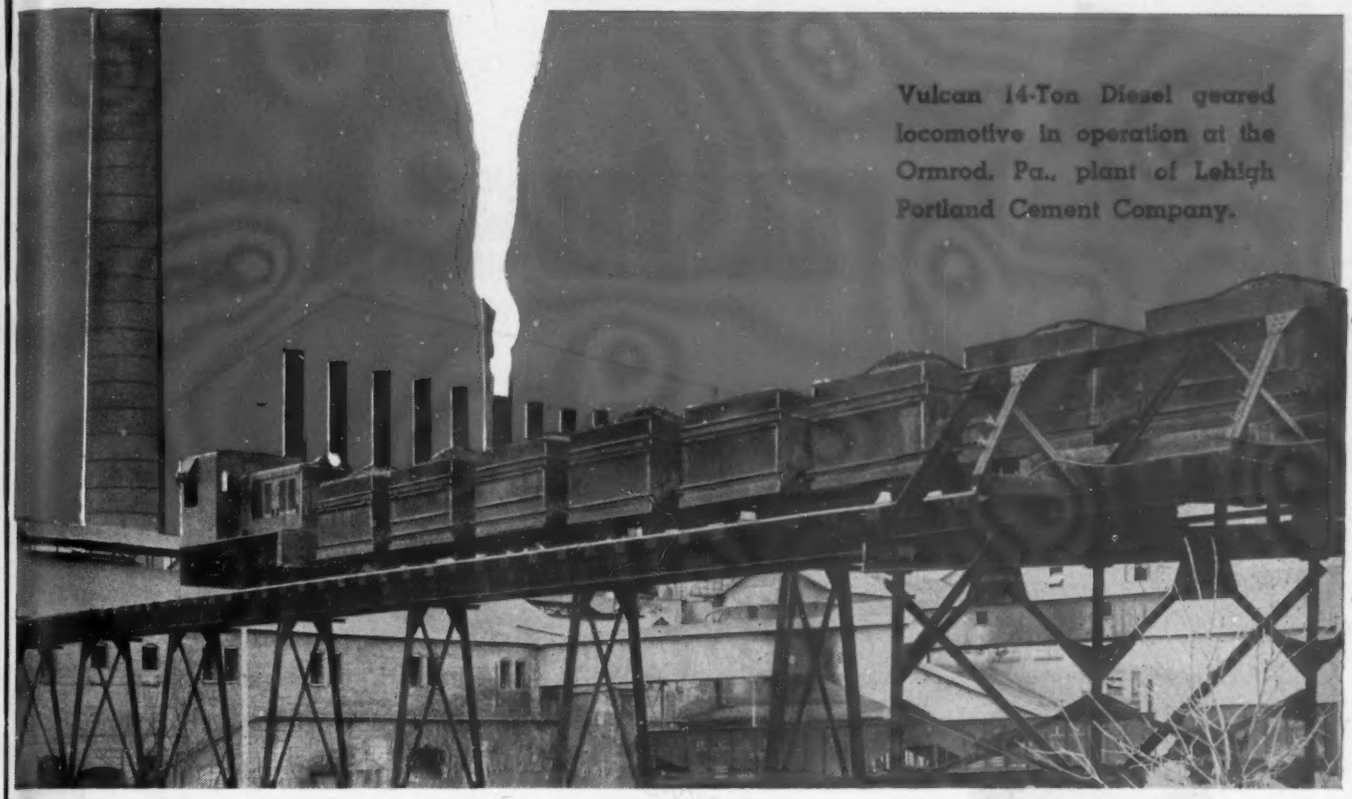
Why You Should Use Homestead LEVER-SEALD VALVES:

1. **Instant Stick-proof operation.**
2. **QUARTER-TURN FULLY OPENS OR CLOSES.**
3. **Positive seal without lubrication.**
4. **Seating surfaces always protected in both open and closed positions. Corrosion practically eliminated.**
5. **Unobstructed straight-line fluid flow.**
6. **All operating parts protected from damaging effects of service conditions and weather.**

Homestead V LEVER-SEALD VALVES

"M" Pennant with three additional gold stars—highest Maritime production award yet given to the men and women of any manufacturing company.

HOMESTEAD VALVE MFG. CO. • • • P. O. BOX 22 • • • CORAOPOLIS, PA.



Vulcan 14-Ton Diesel geared locomotive in operation at the Ormrod, Pa., plant of Lehigh Portland Cement Company.

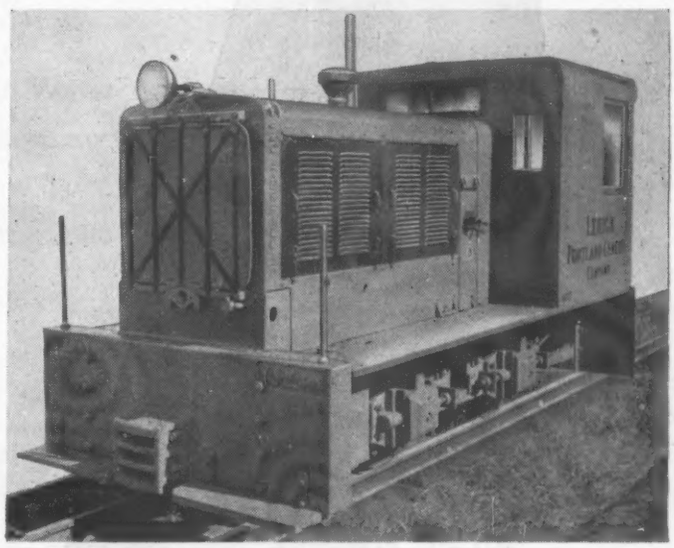
Eight Years of Money-Saving Service

and still "As Good as NEW"

Since July 1937 this sturdy Vulcan locomotive has been hauling ten-car trains of heavy rock from crushing plant to grinding mill—averaging 250 cars per 8-hour day over a three-quarter-mile round trip: with a maximum grade against the load of approximately one percent. And for all practical purposes, it's still as good as new.

Much of the credit for this money-saving record must go to the competent executives who have been responsible for its operation and maintenance, but back of it all are the ample margins of strength and power for which Vulcan locomotives have always been noted and which have made them the choice of many other great industrial organizations for over half a century.

More and better Vulcan locomotives are being built today than ever before—steam, gasoline, Diesel and Diesel-Electric—from 6 to 100 tons in weight—wide or narrow gauge. Deliveries are still subject to approval of the War Production Board but inquiries are cordially invited and will be given the fullest possible benefit of whatever priority can be secured.



Close-up of 14-Ton Vulcan locomotive shown in operation above. Equipped with 6-cylinder Caterpillar Diesel engine rated 145 hp. at 1000 r.p.m. and Constant-Mesh Four-Speed Spur-Gear Transmission which not only facilitates speed-changing but also eliminates all possibility of gear-stripping.

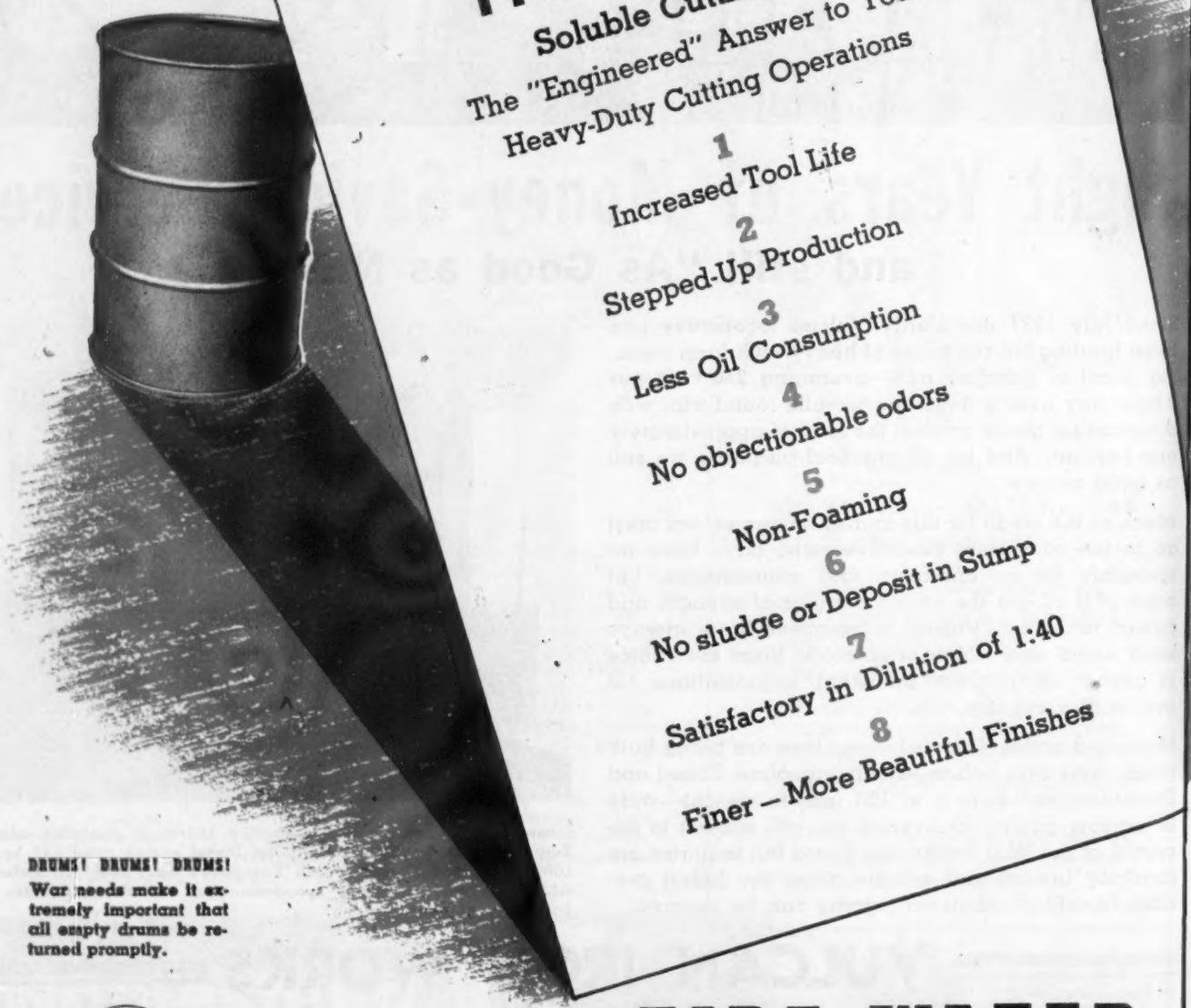
VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Steam Locomotives	Rotary Kilns, Coolers and Dryers	Toothed, Double-Roll Crushers	Heavy-Duty Electric Hoists
Diesel and Gasoline Locomotives	Rotary Retorts, Calciners, Etc.	Heavy-Duty Briquetting Machines	Self-Contained Electric Hoists
Diesel-Electric Locomotives	Improved Vertical Lime Kilns	Ball, Rod and Tube Mills	Scraper-Loading Hoists
Electric Locomotives and Larrys	Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears

NEW TYCOL heavy-duty



TYCOL No. 675

Soluble Cutting Oil

The "Engineered" Answer to Your Heavy-Duty Cutting Operations

1. Increased Tool Life
2. Stepped-Up Production
3. Less Oil Consumption
4. No objectionable odors
5. Non-Foaming
6. No sludge or Deposit in Sump
7. Satisfactory in Dilution of 1:40
8. Finer — More Beautiful Finishes

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned promptly.

INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER

Principal Branch Offices:

Boston • Philadelphia • Pittsburgh • Charlotte, N. C.

soluble cutting oil

makes light work of tough cutting jobs

This is a modern heavy-duty soluble cutting oil. Its highly stable emulsion resists admixture with contaminating machine oil . . . permits surface cleaning without the use of a degreasing agent . . . and retards corrosion, even when it is diluted 1:40.

Operators find that for heavy duty grinding or cutting, Tycol 675 increases production . . . lengthens tool life . . . and machines to finer finishes.

Call or write your nearest Tide Water Associated office for the complete story. They will gladly recommend the correct Tycol cutting oil you need – whether it be the new Tycol 675, or one of the many other performance-proved Tycol cutting oils "engineered" specifically for every type of job.

FASTER CUTTING

The better cooling and lubricating ability of Tycol 675 permits material savings in time and enables greater output even on the toughest steels.

FINER FINISHES

Tycol 675 won't gum, won't corrode, nor will it tarnish the work. This one factor will lead thousands of machine tool users to insist on Tycol.

LONGER TOOL LIFE

Tools that are used with Tycol 675 Heavy-Duty Cutting Oil will have a long useful life. The physical properties of the oil, materially cut the possibility of chip welding to the tool. Regrindings are reduced to a minimum.

ASSOCIATED OIL COMPANY

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

Eastern Division:

17 Battery Place, New York 4, N. Y.

Not everybody

Few manufacturers possess the versatile production facilities of The Standard Products Company.

Standard is prepared to develop and plan for industry, parts of molded rubber, steel stampings, plastics, in almost any shape or form.

The services of The Standard Products Company Research Laboratory and Engineering Departments are at your disposal. Let us have the necessary data and our engineers will submit designs and proposal.

The Standard Products Company is the world's largest manufacturer of glass run window channel and contour weather strip. Production and replacement channel for passenger cars, truck cabs, busses, motor boats, airplane cabins and streamlined trains is now available for delivery.

Your inquiries are solicited.

THE STANDARD PRODUCTS COMPANY

Main Offices and Research Laboratory

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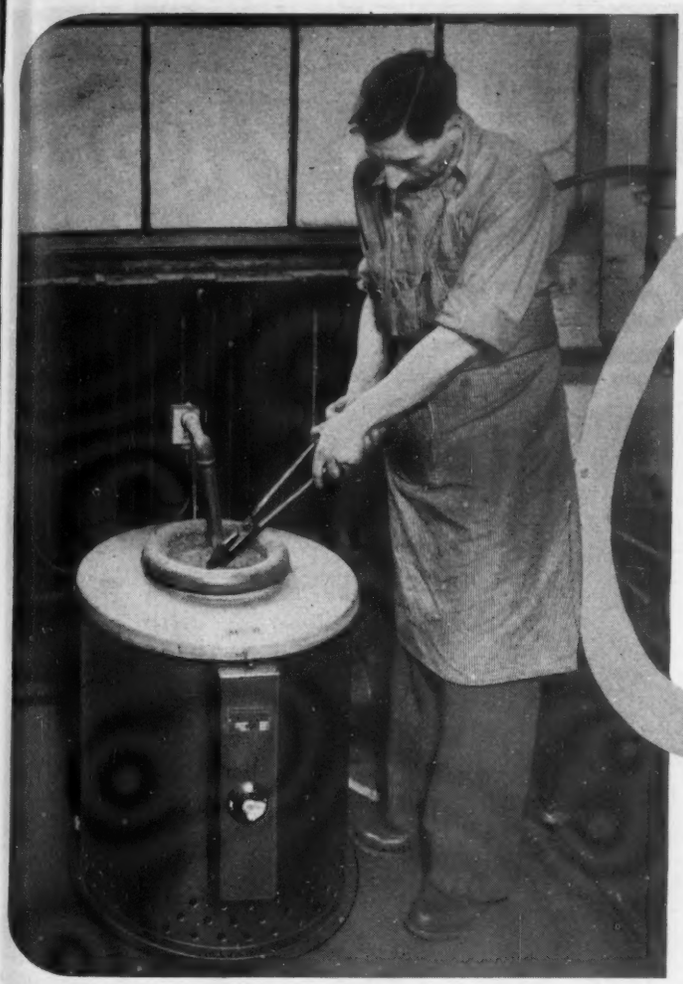


HEVI DUTY ROUND POT FURNACES

An MU-814 Round Pot Furnace at the Bassett Spring Co., Cleveland, Ohio.

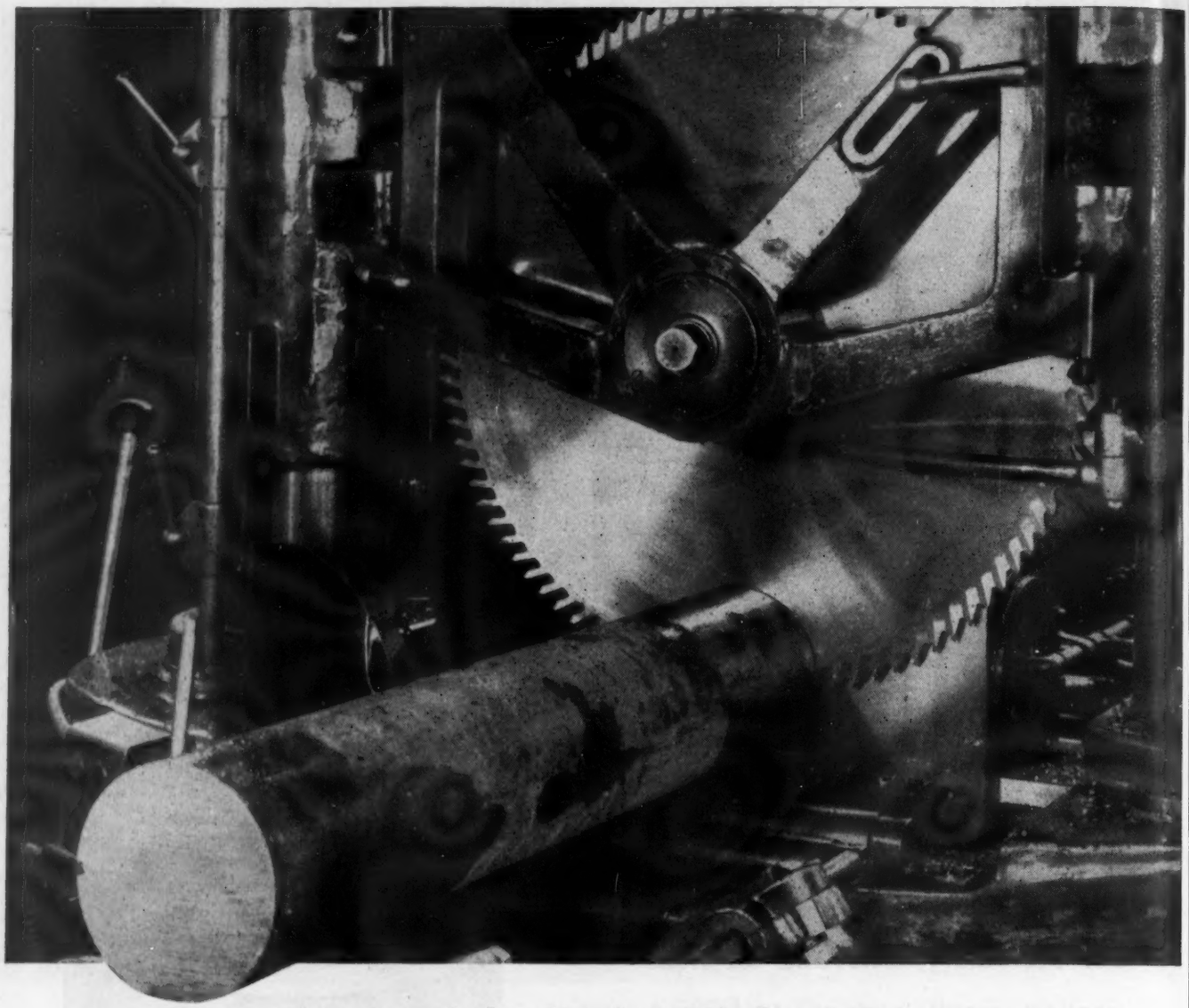
For laboratory tests and for heat treating small springs, tools and dies, the Bassett Tool Co., Cleveland, use a Hevi Duty Round Pot Furnace. The even distribution of the heating units around the pot of the MU-814 Furnace causes the bath and the work to be uniformly heated. Sizes and other types of Hevi Duty Pot Furnaces are detailed in Bulletin HD-534 . . . send for your copy.

An MU-814 Round Pot Furnace

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN



They Cut Straight Under Highest Pressure without Chatter or Vibration . . .

SIMONDS SEGMENTAL METAL-CUTTING SAWS

High-speed teeth segments are tongued into the groove in the saw plate, then held rigidly in place by 5 rivets each. What's more, this saw plate is specially heat-treated, so that it's virtually unbreakable. This construction gives extra cutting life . . . because it gives the highest tensional and torsional strength. And you can always make ready replacements of the interchangeable segments.

For work requiring fine pitch and extra-smooth cut, Simonds Segmental Saws combine the best features of all types of fine-tooth saws . . . then add the exclusive feature of Simonds high-speed steel, specially heat-treated to withstand the overloading on high-production cutting jobs.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash.

Production Tools for Cutting Metal, Wood, Paper, Plastics

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASSACHUSETTS

TO RESIST WEAR AND BREAKAGE

WHAT STRONG TEETH THEY HAVE!

That is point number one in buying gears—teeth that resist wear, that do not break under strain.

When your gears are cast steel, you can add to wear resistance such important properties as good machinability, and *uniform* tensile strength with absence of flow lines.

Cast steel gears also may be given differential heat treatment, and are readily weldable should repairs become necessary.

It is sometimes possible to use gears with cast teeth—eliminating costly gear cutting operations.

The properties most useful for the job can be specified in advance—for gears as well as other mechanical or structural parts—all the desirable properties of steel as a material, in any combination you require.

Add to that the economy of the casting process in producing any shape you want, with resulting savings in finishing and assembly.

Through extensive research and improved techniques, steel castings offer you advantages over any other methods of adapting steel itself to your purposes.

Whatever you make, or plan to make, it's good, sound business to consult your steel foundryman—especially in the planning stage. Or you may feel free to write direct to Steel Founders' Society, 920 Midland Bldg., Cleveland, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

The best way to inspect a Weld-

Ability to determine physical characteristics of a spot-weld just by "looking at it" (*) is one result of the new welding process used by International Harvester in fabricating half-tracks at its Springfield plant.

Employing PWC automatic-cycle self-compensating "Temp-A-Trol" spot welders, the process made possible:

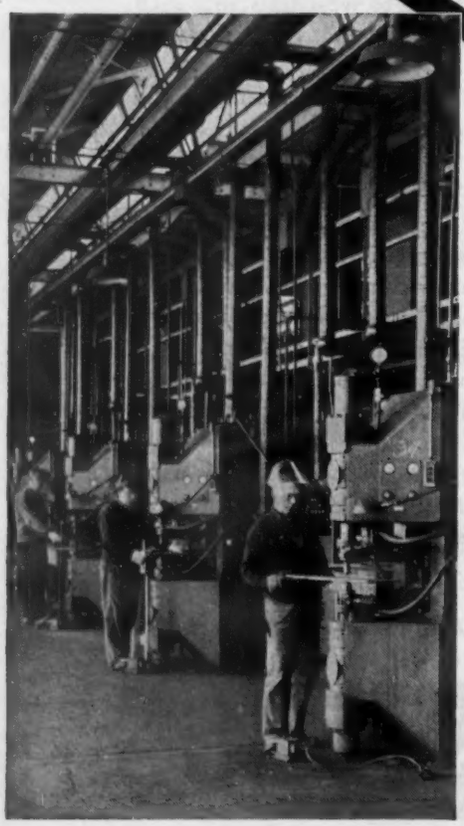
Automatic heat-treating of each weld, plus
Automatic tempering of each weld, plus
Automatic grain-refinement, plus
Visual Inspection for Quality

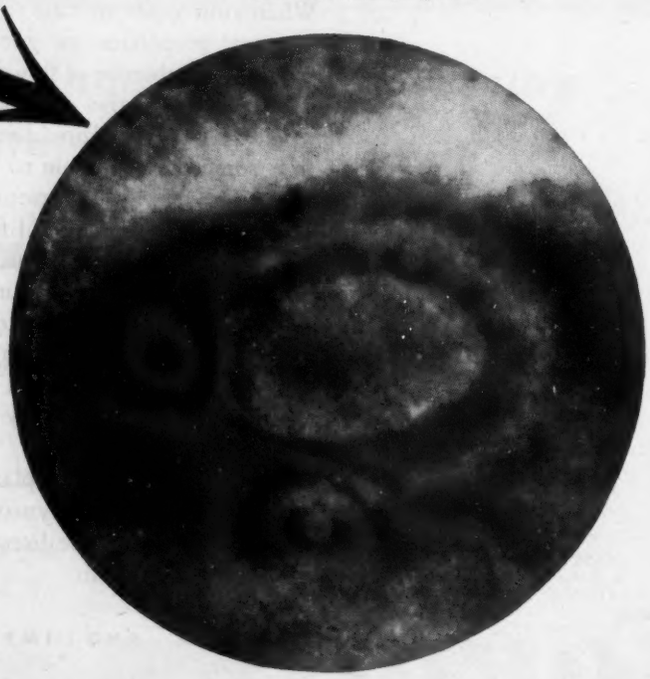
. . . all in one operation
. . . using relatively untrained operators
. . . with 38 machines doing the work of 200 arc welders

We will be glad to tell you the complete story of this vital new welding development. Ask for Bulletin #353

*Hardness for instance within a couple of points Rockwell "C"

LOOK AT THE "RINGS"

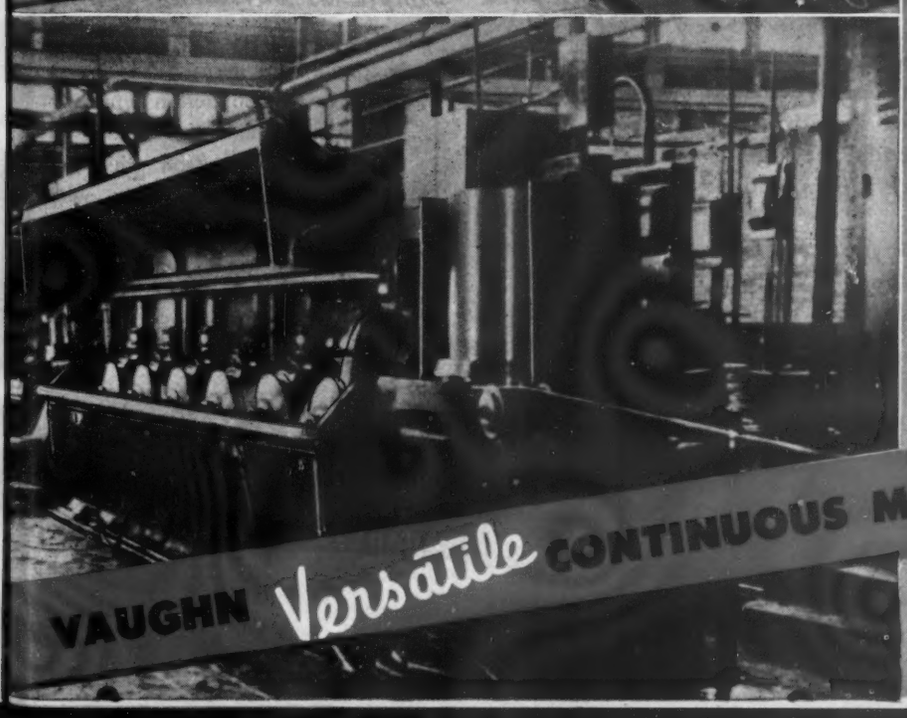




PROGRESSIVE WELDER CO.

SEAM PROJECTION & BUTT • *Electric Welding Equipment* • PORTABLE GUN & PEDESTAL

3050 E. OUTER DRIVE • DETROIT 12, U. S. A.



V

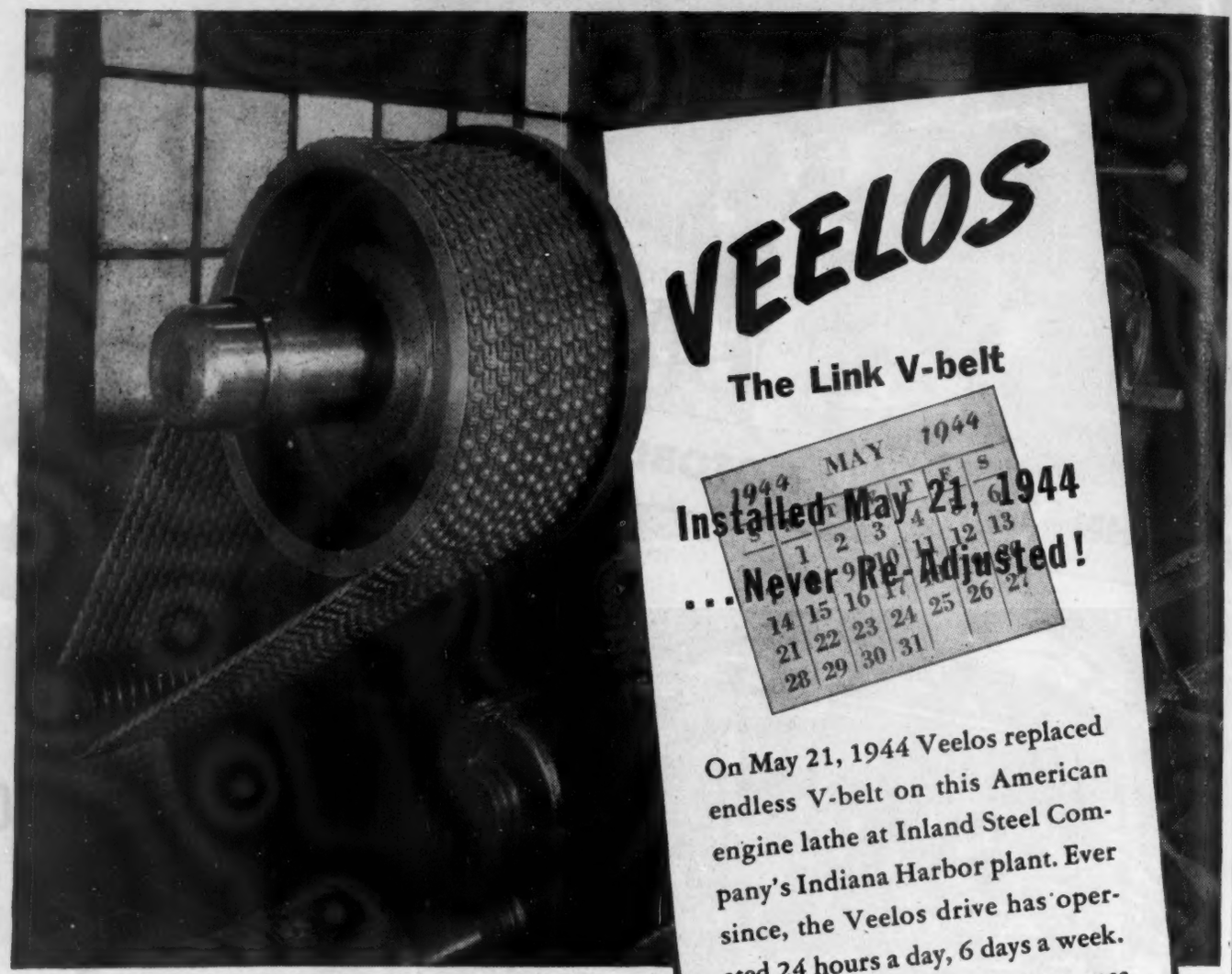
BUILT IN PRODUCTION ABILITY—

characteristic of all vaughn wire drawing equipment.

The Vaughn Machinery Company

Cuyahoga Falls, Ohio

COMPLETE COLD DRAWING EQUIPMENT
Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.



VEELOS

The Link V-belt

Installed May 21, 1944 ... Never Re-Adjusted!

On May 21, 1944 Veelos replaced endless V-belt on this American engine lathe at Inland Steel Company's Indiana Harbor plant. Ever since, the Veelos drive has operated 24 hours a day, 6 days a week. *Yet the Veelos belt has never once been re-adjusted.* That's a remarkable record!

In Every Type of Industry... as In the Steel Industry... Link Construction Ups Production

Link construction of Veelos turned the trick at Inland... and link construction makes Veelos the most adaptable of V-belts for any drive. Quick, easy tension adjustment ends slippage ...keeps machinery running at full speed and productivity.

With Veelos, design engineers can *fit the belt to the drive—rather than the drive to the belt.* Write today for free Veelos manual giving complete details.

MANHEIM MANUFACTURING & BELTING CO.
MANHEIM, PENNSYLVANIA

Simple as Buttoning a Shirt

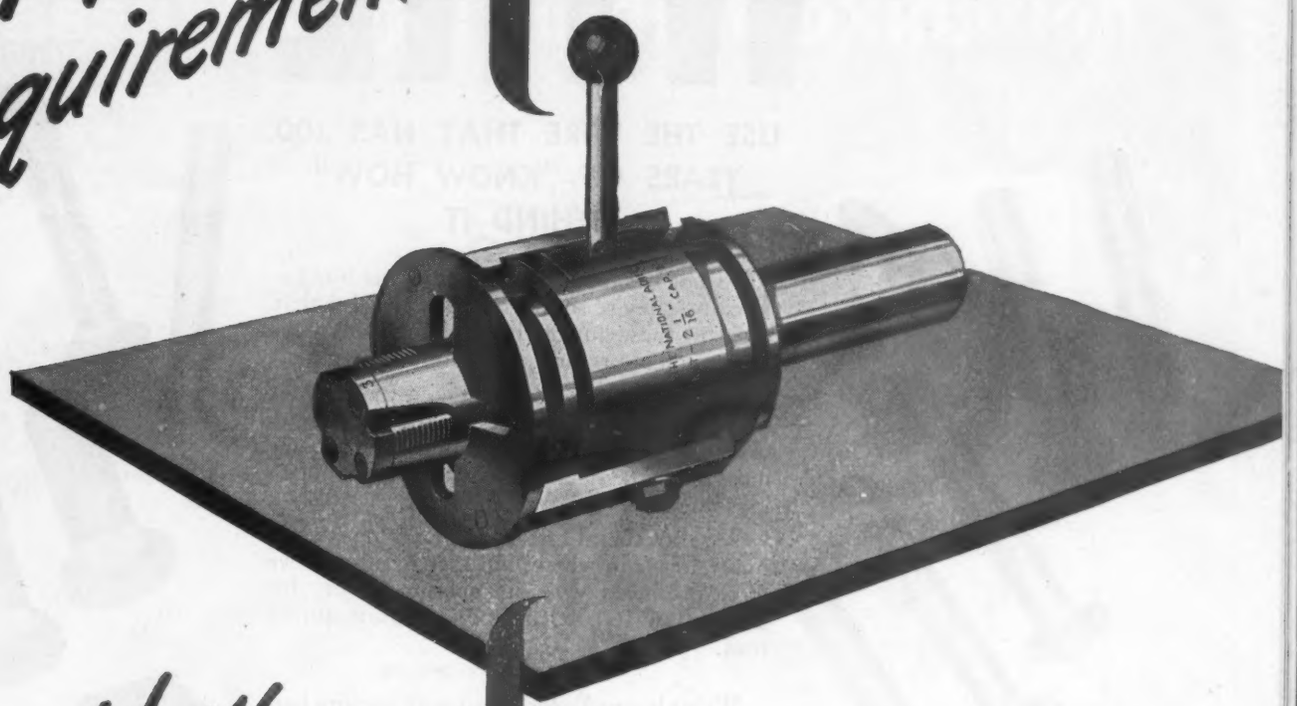
Get the "hang" of it, and you'll couple and uncouple Veelos as easily as you button your shirt. This unique, link construction is the big reason why *production goes up when Veelos goes on.*

VEELOS
THE LINK
V-BELT

Adjustable to any Length
Adaptable to any Drive

New Tapping Requirements

Tougher alloys
Finer Limits
Smoother finish
Longer runs



New Namco Tap meets them ALL

This new "RST" Collapsible Tap retains the design advantages of back supporting chasers their full length on heavy core piece, side supporting by heavy body—stamina for tough alloys.

Ground thread chasers—for fit and finish.

New Feature is *positive* and *instant* control at point set for collapsing, no lost motion, and chasers reset to precise diametric adjustment.

RST is a universal, double-duty tool—simply remove handle for revolving spindle machines —a BIG saving in tool investment.

Send for your copy of New Tap and Die Catalog D-42-B. Complete information on automatic taps and dies made especially to serve the higher standards of precision at lower threading costs.

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE CHRONOLOG • LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

for better WIRE *products*

USE THE WIRE THAT HAS 100 YEARS OF "KNOW HOW" BEHIND IT

IT'S not because they're glamorous but because they're so indispensably useful that we show these nuts, bolts, and screws to illustrate typical products made of steel wire.

Without these simple, taken-for-granted metal fasteners to hold things together, some of our most costly and ingenious devices, our most intricate machinery, our stateliest buildings might never have been built.

Wire for metal fasteners is only one of the many forms in which, for over a century, we have produced wire of superior quality for more than 160,000 different manufacturing uses.

Improved by war service

We've learned a lot about making wire better during these war years. We know how to turn it out faster and in greater quantities, and to meet the most severe specifications. New and better steels have been developed to give wire ever greater versatility.

All this means that as more American Quality Wire is released for civilian manufacturing you'll find it better than ever before—to do a better job for you.

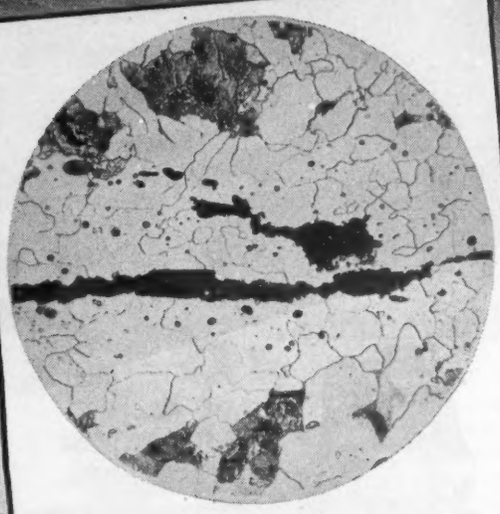
AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago, New York
Columbia Steel Company, San Francisco
United States Steel Export Company, New York

AMERICAN STEEL & WIRE COMPANY
USS
AMERICAN
MANUFACTURERS
WIRE
UNITED STATES STEEL

UNITED STATES STEEL

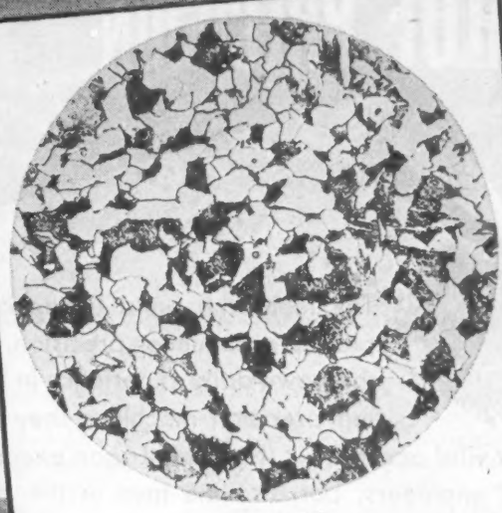
"FERROCARBO"-S
assures thorough deoxidation



MAG. 500-X

Normal killed steel, untreated. Transverse tests, middle of ingot, taken from production cycle:

Yield Strength	57,700	Elongation in 2"	.70
Ultimate Strength	62,200	Reduction of area	1.2



MAG. 500-X

Same steel, "FERROCARBO"-S treated. Transverse tests, middle of ingot, taken from production cycle.

Yield Strength	60,000	Elongation in 2"	17.5
Ultimate Strength	81,500	Reduction of area	32.6

Thorough deoxidation — with striking effect on inclusion reduction and dispersion—results from using "FERROCARBO"—S.

Its effective improvement in steel quality is demonstrated beyond question by photomicrographs, stepdown tests, macro etch tests, and Baumann sulphur prints. Magnaflux tests, too, provide conclusive proof of this marked improvement in steel quality.

Compare the accompanying photomicrographs of SAE Forging Steel 1035... made with and without "FERROCARBO"—S. Note particularly the uniformity of structure and absence of ghost lines in the "FERROCARBO"—S treated steel. Comparative physical constants complete the story and offer further proof that "FERROCARBO"—S gives better steel.

This one material . . . used as a ladle addition . . . not only assures thorough deoxidation, but also provides these other important benefits: **Inclusions reduced—uniformly distributed—stringers eliminated; prolonged increase in fluidity; in fine-grained steel—inclusions reduced and dispersed; added ductility.** Moreover, under controlled conditions, an increase in hardenability can be effected to a considerable degree.

Let our metallurgists show how you can use "FERROCARBO"—S. Write The Carborundum Company, Refractories Division, Dept. R3, Perth Amboy, N. J.

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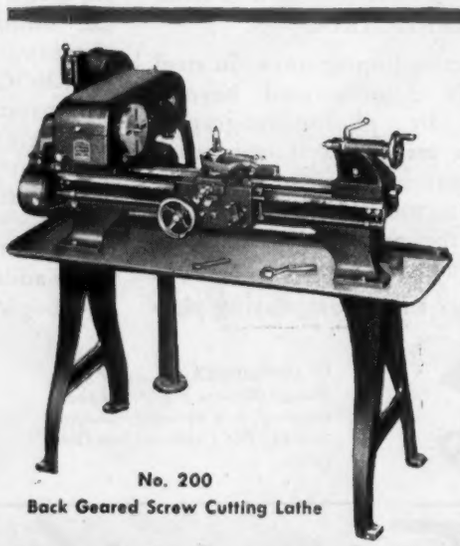

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Back Geared Screw Cutting Lathe

Brief Specifications

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Spindle nose diameter and threads per inch, 1½"—8
Spindle speeds (back gears engaged) . . 30, 56, 104, 131, and 244 r.p.m.
Spindle speeds (direct belt driven) . . 179, 334, 420, 620, 780, and 1450 r.p.m.
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LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS

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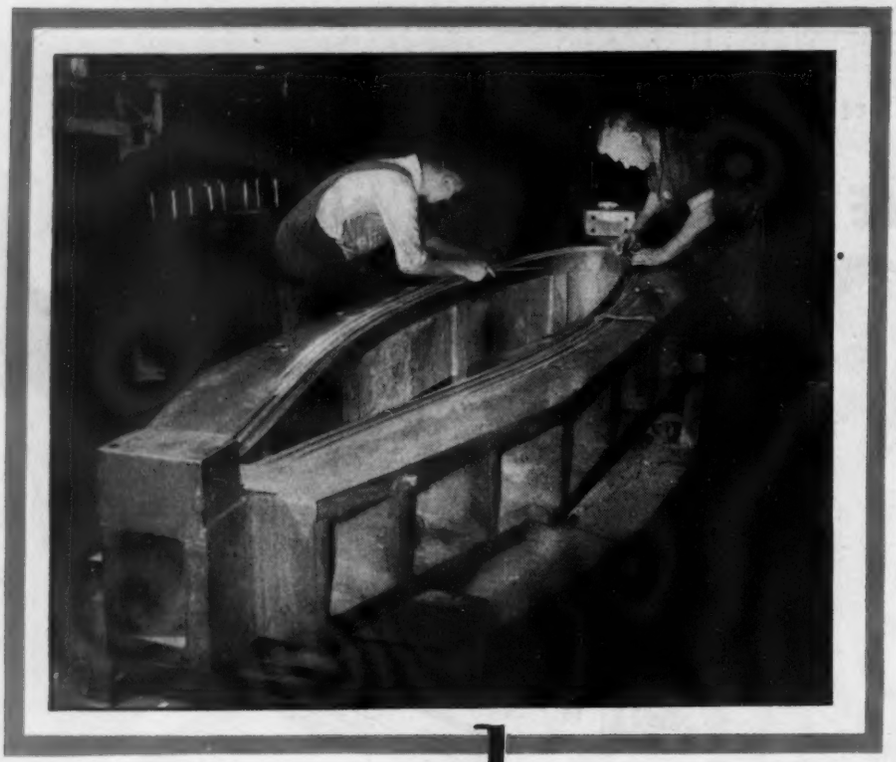

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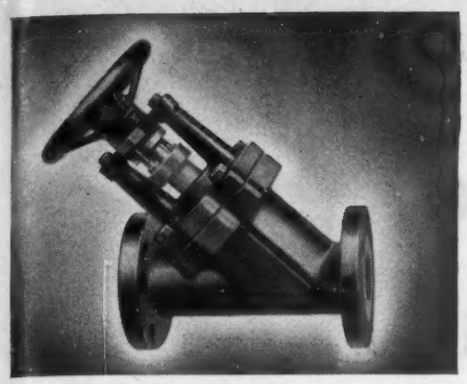

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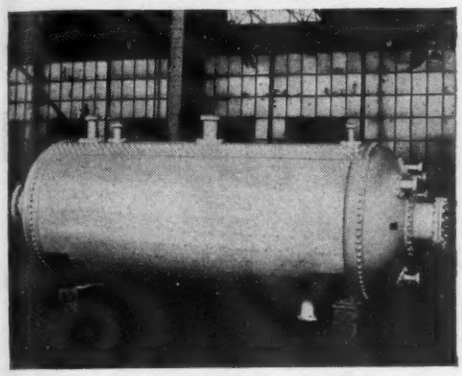

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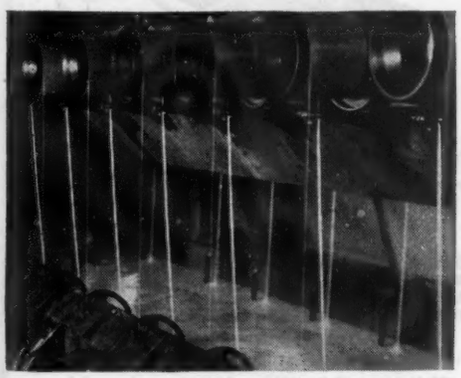

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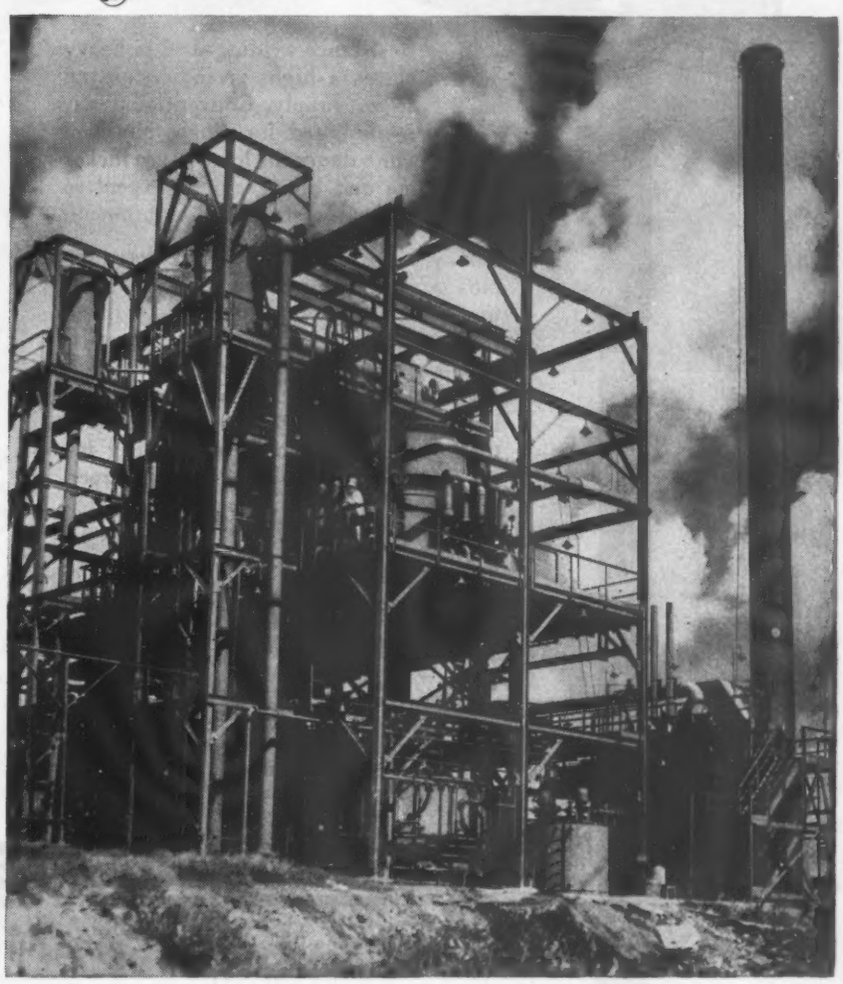

5 More than 200 complete sulfuric acid recovery plants have been installed by National Lead. Several of these units have been in continuous operation almost twenty years. So remember, for everything from pipe to an acid recovery plant, *Go "National" for Lead.*

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evenly balanced three-phase load...

Resistance welding steel in heavy gauges places a high, periodic demand on the power supply. Conventional a.c. welders — designed for single phase — seriously unbalance the load, cause flicker in the line and often require expensive substation and distribution equipment.

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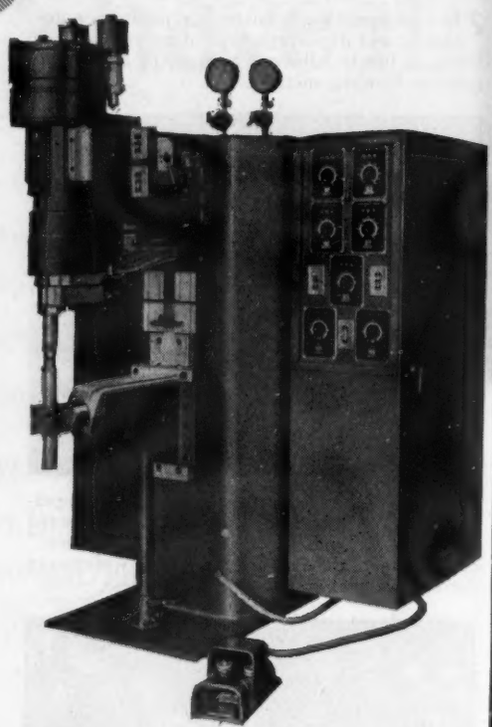

Write for bulletin 204-A describing fully the principle of the Sciaky "THREE-PHASE".

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Manufacturers of a Complete Line of AC and DC Electric Resistance Welding Machines

4915 West 67th Street **Chicago 38, Illinois**

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Hold that line!

A thought on peace-time business that helps war production

Stabilized, maximum employment is not only possible, it's essential if we are to maintain our American standard of living —and you can do something about it—*now*.

We Suggest This . . . (1) Determine your minimum needs to begin post-war business. (2) Place unrated orders for these necessary materials to be delivered when restrictions permit. (3) Advise your customers to follow this same plan.

Here's Why . . . (1) This plan permits *suppliers* to anticipate your needs and begin earlier production on them. (2) It also gives *you* a backlog to start you off when Uncle Sam cancels *his* orders. (3) Employees knowing of your activity in this respect will be more content and interested in their work—they'll feel more secure about your business offering peace-time jobs. (4) Your staff will be oriented in their thinking and less susceptible to vague reconversion worries.

With all business following this plan, the gap will be shortened. Depleted world markets will be more *quickly* exploited. Those 55 million peace-time jobs needed for an ideal post-war economy will be much closer to actuality.

Remember . . . *Good* management always sees its responsibility to the overall national welfare. As C.E.D. reports, "the companies that are doing the best on war contracts are the same ones that are doing the best post-war planning." For reprints of this ad, write Heppenstall Company, Pittsburgh 1, Pennsylvania.

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- **NO MOVING PARTS, EXCEPT PAN**
- **COMPETELY AUTOMATIC**

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INDUSTRY

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116, NO. 15 April 9, 1945

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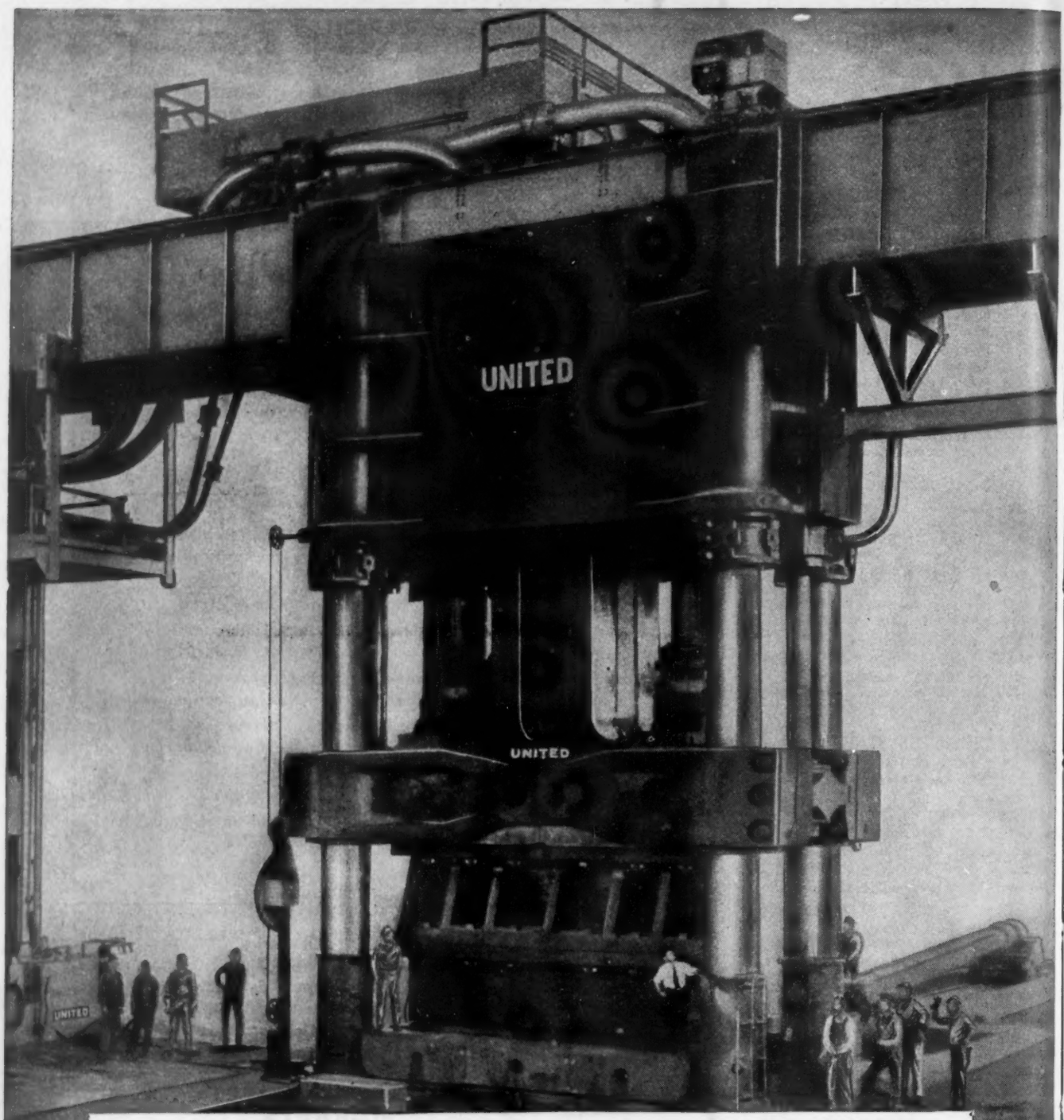


Nickel Steel columns guide 14,000 tons to work

This 74-foot Giant has a working stroke of 10 feet.

Pivotally supported rams enable it to deliver, without sway, the full 14,000 ton pressure at 6 feet off center.

Columns of Nickel alloy steel guide this tremendous force. Each column is 66 feet long and 34 inches in diameter, forged and heat treated to assure a minimum yield point in tension of 60,000 p.s.i. with 18% elongation.

These columns exemplify the strength and toughness that Nickel imparts to alloy steel forgings of large cross-section.

The press, a product of United Engineering and Foundry Company, represents a notable engineering and production achievement. It is now turning out gun barrels, ship shafts and other heavy forgings.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET NEW YORK 5, N.Y.

STEEL
April 9, 1945

Industrial Peace

Initial reaction to the charter for industrial peace announced March 28 by William Green, Eric Johnston and Philip Murray has been exceedingly favorable. Most persons who have commented upon it publicly have applauded its objectives and endorsed it in principle. Those who have greeted it with reservations seem to be concerned chiefly with its practicability.

Ira Mosher, president of the National Association of Manufacturers, declared that the charter should have been drafted by a larger and more representative group and that its seven principles are "generalities on which there is already wide agreement."

George Romney, managing director of the Automotive Council for War Production, in answer to a question asked on the Town Hall radio program, stated that he favors six of the principles and on the seventh—that recognizing management's right to direct an enterprise—he will wait to see whether the unions' avowal of this principle means any more than their no-strike pledge.

Raymond Moley, while declaring that the charter deserves studied approval, wonders if there may be a joker in the statement that the right of labor to organize and to engage in collective bargaining shall be recognized and preserved "free from legislative enactments which would interfere with or discourage these objectives." Mr. Moley asks whether this means that labor and management are pledged not to amend the Wagner act.

Several economists have raised their eyebrows at the principle which recognizes the desirability of "employment at wages assuring a steadily advancing standard of living." They ask whether management is in a position to pledge the payment of such wages.

These and other questions should be given consideration according to their merit and at the proper time, but they should not be permitted to impede or block the movement for industrial peace which Messrs. Green, Johnston and Murray have started. The goal of a sound labor-management charter, drafted and made operative independent of government influence, is too important to be thwarted simply because the original document may not be perfect in every detail.

A postwar partnership between American labor and management is just as important in its sphere as an international organization for peace is to the nations of the world. Stubborn insistence for perfection could smother the bid for industrial peace just as easily as it could defeat the purpose of the approaching San Francisco conference.

This is a time to work for and not against peace—industrial and international.

LIBERTY VS. AUTHORITY: By all means read "The Road to Serfdom" by Friedrich A. Hayek. If you cannot obtain the book published by the University of Chicago Press, read the carefully prepared condensation of it in the April issue of "The Reader's Digest."

The author, who spent half of his adult life in his native Austria and the other half in the United States and England, has written an arresting warning to liberty-loving citizens in democracies to resist the tendencies which led to the rise of fascism and Nazism in Germany.

Among these tendencies are the disposition of the public to lay its troubles on the doorstep of the government, the steady increase of state control and power, rule by directive instead of by law, a fetish for national planning and glib promises by the state to the individual of security from cradle to grave without regard to the problems involved.

"The supreme tragedy" says Professor Hayek, "is that in Germany it was largely people of good will who, by their socialist policies, prepared the way for the forces which stand for everything they detest." Unfortunately there are people of good will

(OVER)

in America who unwittingly could make the same mistakes.

Read Hayek and you will renew your vigilance against further encroachments on personal liberty.

• • •

FRISCO CONFERENCE: One of the principles in the Act of Chapultepec, adopted by the United States and 20 Latin-American countries, reads as follows:

"Economic collaboration is essential to the common prosperity of the American nations. Want among any of their peoples . . . affects each one of them and consequently all of them jointly. The American states consider as necessary the just coordination of all interests to create an economy of abundance in which natural resources and human labor will be employed for the purpose of raising the standard of living of all the people on the continent."

United States representatives hope to incorporate the Chapultepec principles in the charter of the General International Organization at the San Francisco conference. If they succeed and if the conference adopts this idea for world-wide application, a first step will have been taken toward fostering international trade through developing buying power at grass roots levels.

It is a bold program, challenging the skill of the world's ablest experts. —p. 84

• • •

LABOR PEAK IN JUNE? War Manpower Commissioner McNutt reports that last February was the first month since July 1942 in which the number of persons in the civilian labor force was larger than that of the same month in the preceding year. The civilian labor force numbered 51,100,000 in February, 1944, and 51,400,000 in February, 1945.

In spite of this encouraging comparison, WMC says that the munitions program for the six-month period from February to August will require that employment in the munitions industries be increased by almost 300,000 by June, 1945. The catch in the situation is that some of the workers added to the civilian labor force in February went into nonessential work and not into employment on munitions.

Legislation to allocate jobs probably cannot be passed now. Apparently Congress has scuttled the manpower bill—largely because of conflicting testimony as to its need. —pp. 83, 84

RE: RECONVERSION: Ahead-of-schedule progress on the battle fronts in Europe and Asia has precipitated a sudden revival of interest in reconversion plans. Just before James F. Byrnes resigned from his office as director of the Office of War Mobilization and Reconversion, he issued a report to the President and to Congress (p. 75) in which he forecast a reduction in Army requirements of 15 to 20 per cent in the three months following V-E Day and 40 per cent before the end of the year following Germany's collapse. . . . Following the release of the Byrnes report, J. A. Krug, chairman of WPB, outlined a 12-point procedure program (p. 77) to be followed by the board after V-E Day. It calls for a progressive relaxation of controls, under which industry would be able to resume output on many items of civilian goods within a year after the end of hostilities in Europe. . . . It is believed that the cutbacks contemplated by the government will cause a drop in steelmaking operations of as much as 30 per cent for a period after V-E Day (p. 78), after which accumulated civilian demand will gradually push production up to high levels. . . . Comparisons of progress in reconversion in England and the United States are apt to be misleading. Judged by some standards (p. 79), British plans are more advanced than those in the United States. When the Germans counterattacked last fall, American reconversion plans were shelved, whereas the British went ahead with their program. During the past eight months 1100 British companies have been authorized to do experimental and development work on postwar models. . . . Considerable confusion still envelops the difficult problem of shifting the facilities of the automotive industry from war work to civilian motor cars. Automobile builders fully accept their responsibility to keep on with war work to the end (p. 91), but they feel they should be permitted to do some preparatory work, on an individual company basis, which would facilitate reconversion when the time for it arrives. They would like to place orders for the 7500 machine tools they will need and to do some preliminary engineering work. . . . General Motors President C. E. Wilson last week expressed the hope government controls can be lifted sufficiently after V-E Day to permit production of some cars before the end of this year.

E. L. Shaner

EDITOR-IN-CHIEF

Finer Things
Are Coming Out of the Ground

From the ore ranges, the coal fields, and the limestone beds are coming vast quantities of blended iron ore, coking coal, and purest limestone—the principal ingredients for making steel, the "master metal" in both peace and war.

Today this steel must all go into the production of the materiel of war, but tomorrow, when Victory is ours, finer things will come to us from out of the ground because of improvements now being made in steel.

Inland metallurgists are constantly testing and re-testing, melting and re-melting, adding one element and taking away another—always seeking for something better. Already they have contributed many new methods and new steels to production for war.

These, and the newer methods and Inland steels that are sure to come from continued intensive research, will help you meet the needs of America at peace.

INLAND STEEL COMPANY

38 South Dearborn Street, Chicago 3, Illinois

Sales Offices: Cincinnati • Detroit • Indianapolis • Kansas City • Milwaukee • New York • St. Louis • St. Paul

Why These Mean The Same

1 · Ryerson
2 · Steel from Stock

And How They Benefit Your Company Today

Though Ryerson steel-from-stock service to your company today can't always be as complete and fast as we'd like it, nevertheless, certain features of our service are probably more helpful than ever before.

If, for example, some particular item your company needs is not available—though our stocks in eleven plants are more diversified than any in the country—then we do our level best to recommend an item that will serve. And the recommendation is practical—made by men with extensive theoretical as well as practical technical experience with steel.

In most cases we can still deliver the steel you want, when you want it and where you want it.

Thus your purchasing executives can concentrate their steel-buying with Ryerson and know that Ryerson dependability is the same as always. That all your Ryerson contacts will be sincerely interested in helping with your steel problems. That all we have learned from more than 100 years in the steel business is at your service. If your company hasn't our latest Stock List and Data Book, will you please write our nearest plant.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL

Predicts Limited Shift to Civilian Output After V-E

Byrnes, seeing early victory, resigns as director of Office of War Mobilization and Reconversion. Forecasts 40 per cent decrease in Army requirements within year after Germany is defeated

Fred M. Vinson, left, succeeds James F. Byrnes in the Office of War Mobilization and Reconversion

WAR contract cutbacks after the fall of Germany will release raw materials and manpower to give durable goods industries a "good start on reconversion," James F. Byrnes, director, Office of War Mobilization and Reconversion, predicted in a second report to the President and Congress last week.

Mr. Byrnes forecast a reduction in Army requirements of 15 to 20 per cent in the three months following V-E Day and about 40 per cent before the end of the year following Germany's collapse.

Soon after his report was submitted, Mr. Byrnes' resignation as OWMR director was announced and the President appointed as his successor Fred M. Vinson, Federal Loan Administrator. In his letter of resignation, Mr. Byrnes advised the Chief Executive, "I think V-E Day is not far distant."

The opportunities for reconversion during the period between V-E and V-J Days are likely to surpass the reduction in munitions production, the OWMR director said. This implies that while manufacturers will continue to ship large quantities of finished munitions, they will be making them from raw materials and components inventories on hand. Purchasing of new raw materials may cease or taper abruptly for war contract use. This will permit steel, nonferrous metals and other materials now channeled largely into war products to be ordered for civilian goods output.

While the Byrnes report was definitely cheering, officials of the War Production Board cautioned against undue optimism regarding early output of the major "hard items" in civilian goods. While many of the raw materials may be available within a few months, they point out, bottlenecks in other essential materials will develop.

Citing automobiles as an example, a WPB official said that while the automakers may be able to obtain all the steel and machine tools necessary to produce new cars, textiles, rubber and other components likely will be scarce.

Other officials emphasized the tremendous quantity of materials that will be needed to "fill the pipeline" to the Pacific war zones. Operations against Japan still are on a relatively small scale when compared with the volume of materiel which is being shipped to Europe. Following V-E Day, a large-scale shift of munitions to the Orient will be necessary. Munitions production, though reduced, will still absorb a large proportion of the manpower and materials available. Mr. Byrnes estimates war production during the period between V-E and V-J Days will be 50 per cent greater than Germany was able to produce at her peak.

Cutbacks To Be Gradual

The pattern of gradual cutbacks in deliveries of finished munitions is expected to provide a longer transition period. Many munitions items will be completed from inventory of materials and components at the same time that manufacturers are filling their pipelines for civilian production.

"In the first few months after the defeat of Germany it will be necessary to program some essential civilian requirements which must be met if we are to maintain our economy for the war against Japan," Mr. Byrnes stated. "The War Production Board proposes to limit the number of these programs to a minimum and in the main we should leave the choice of what and how to produce, buy and sell to the decisions of the market."

The WPB will use a "streamlined" spot authorization procedure during the early months to increase production of needed civilian goods where sufficient labor and materials are available.

The WPB plans to discontinue the Controlled Materials Plan as soon as it is no longer needed to protect military and essential civilian production. A simple priorities plan will be substituted for CMP in the quarter following the defeat of Germany; CMP orders on the mills will be continued for another quarter.

During the transition period, WPB proposes to "open end" CMP and permit mills to accept unrated orders which do not interfere with delivery of rated orders.

A few supporting civilian activities may be given priority ratings. However, the great bulk of civilian production will go unrated.

The present AAA priority band and the directive system will be retained to break bottlenecks.

WPB will revoke as rapidly as consistent with the continuing war production the L and M and other restrictive orders. Shortages certain to continue after V-E Day will make it necessary to retain limitation orders on materials such as textiles, paper and pulp, lumber, leather, containers and many chemicals.

Limitations on the consumption of most metals will be necessary only for a relatively few months.

An important aspect of the Byrnes report was an estimate that in the six months after V-E Day not more than one million workers will actually be separated from their jobs.

"More than 40 million of our 50 million civilian workers are in jobs that will continue regardless of cuts in war production . . . The direct munitions industries employ only about 9 million. Some of these are women and others are older persons who are working now

to support the war effort and will leave the labor forces when no longer needed. . . .

"Others released from war production will be retained by their present employers to produce civilian products similar to those they are now making for the armed services. The re-employment of these workers and the veterans discharged from the armed services in the period between V-E Day and V-J Day, in trades and services and in reconversion, should present no national problem."

As cutbacks continue, the report says, workers will become more concerned about getting jobs. Farmers will become concerned about markets and prices. Business men will become fearful of the cost of reconversion, of pricing controls, and of high taxation which may wipe out profits.

"Government can contribute to relieving this uncertainty in two ways," Mr. Byrnes said. "It can ameliorate the privations of temporary unemployment, and it can expedite the reconversion of industry, thus shortening the period of unemployment.

"Wages and the cost of living both have increased appreciably during this war. Unemployment benefits should be adjusted upward in line with these increases in wages and the cost of living . . . The resources released from war production must be put to use immediately to develop a powerful industrial momentum. They may be used to develop an expanding economy which will absorb discharged veterans and war workers to the fullest extent feasible when Japan is defeated."

Supports Free Enterprise

Throughout the report, Mr. Byrnes advocated an early return to a free enterprise system.

Among the highlights of the Byrnes report were:

Taxes: Revision of the tax structure for the postwar period should receive consideration of Congress at the earliest possible date; the structure must be designed to stimulate business and help maintain a high level of employment. Earlier recommendations for revisions were reiterated: 1. Acceleration of depreciation allowances; 2. easing of the financial condition of corporations handicapped through lack of capital in carrying out their reconversion plans, by making immediately available after V-E Day a part of their postwar refund of excess profits tax, and by reducing correspondingly the compulsory savings provision of the excess profits tax; 3. increase in the excess profits tax specific exemption from the present $10,000 to $25,000.

Federal Debt: After Germany is defeated, we should be able to devote more attention to economy in government. No nation that has lost a war heretofore has had saddled upon it a public debt as large as the debt that we as victors will have to pay.

One of the earliest starts on reconversion made in an American factory was that of the Grand Home Appliance Co., Cleveland. A manufacturer of tank armor plate early in the war, the company was granted permission to build domestic gas ranges. Above is shown James Mitchell, president, inspecting one of the early models

To the end of February, this country authorized war expenditures totaling nearly $400 billion and the national debt now has passed $233 billion.

Wage Rates: Special study of industries in which the hourly rates have not increased more than the cost of living and adjustments where possible within the stabilization program recommended.

Rationing and Price Control: Distribution and price controls should be continued on scarce items by extension of the Price Stabilization act. OPA should establish postwar prices on newly manufactured goods to facilitate reconversion. Consumer buying power should be kept under control through taxes and continued bond buying. Controls over earnings and wages should be retained.

Contract Settlement: Time required for settling terminated contracts has been reduced and procedures are being advanced to shorten further the period required for settlement. Cost-plus-fixed-fee contracts continue to present a pressing problem.

Surpluses: Separation of the Surplus Property Board from the Office of War Mobilization and Reconversion recommended.

Small Business: WPB's plan for removal of controls expected to aid small manufacturers. War work in small plants will be continued as long as possible. Loans will be made available to facilitate reconversion.

Construction: General relaxation of construction controls will not be possible after V-E Day. Lumber will be in short supply. Period between victory over Germany and Japan's defeat should be used to prepare for building after total victory. Temptation to embark on large public works programs should be curbed.

Transportation: Volume of traffic will decline only slightly following defeat of Germany. Decrease in volume of war goods will be offset by increase in civilian goods traffic. Shipment of military supplies to West Coast will require longer haul. Shortage in rolling equipment is severe.

After Total Victory: To aid a high level of production and employment in the United States and throughout the world, markets and resources should be made accessible to all peaceful nations. To this end, Mr. Byrnes recommended to Congress: 1. Extension and strengthening of the trade agreements act; 2. establishment of an International Monetary Fund; 3. establishment of the International Bank for Reconstruction and Development; 4. extension of the authority of the Export-Import Bank to finance United States foreign trade; 5. repeal of the Johnson act, prohibiting loans to governments in default on their obligations to the United States.

Wartime Controls To Be Relaxed As Quickly as Possible, Krug Promises

Sees most civilian products on market within year after Germany falls, but warns free economy cannot be expected until Japan is defeated. Some shortages to continue. Outlines 12-point procedural program to be followed by WPB

MOST civilian goods, including automobiles, refrigerators, radios, washing machines and similar items, will be manufactured and marketed within a year after Germany's defeat. This prediction was made last week by J. A. Krug, chairman, War Production Board, in outlining WPB's timetable for the release of materials and facilities for reconversion to peacetime production.

Mr. Krug promised the relaxation of controls as quickly as consistent with safeguarding an all-out war effort against Japan, thus confirming the earlier promise by James F. Byrnes, retiring director of the Office of War Mobilization and Reconversion.

The WPB chieftain made it clear that WPB's reconversion plans do not contemplate any long-range programming of the country's industrial structure. The wartime controls, which were adopted with the advice of management and labor, will be relaxed in much the same way.

At the same time, he warned that as long as the Japanese war continues we will not enjoy anything like a free economy. Shortages of textiles, lumber, leather, containers, tires and rubber products, and some metals, such as tin and lead, will continue to exist. Such shortages will necessitate continued controls and will affect the manufacture of civilian products of which they are components.

Procedures Are Outlined

Procedures to be followed by WPB after V-E Day were outlined as follows by Mr. Krug:

1. Cutbacks will be handled, wherever practicable, in such a way as to distribute equitably the production load throughout the nation.

2. Positive assistance through controlled material allotments and preference ratings for new or additional production of a limited number of civilian products now in such short supply as to endanger the war-supporting economy.

3. Measures to facilitate rapid reconversion through positive assistance for tools, equipment, construction, and long lead-time materials and components needed to begin large-scale production promptly when further cutbacks occur.

4. Suspension of most of the so-called "rating floors" which now prohibit the acceptance or delivery of materials, components and equipment on unrated orders. There may be some exceptions in the case of scarce commodities and components.

5. "Open-ending" CMP by permitting the delivery and acceptance of controlled materials (steel, copper, or aluminum) without allotments, subject to preference at mills and warehouses for all orders covered by allotments.

6. Relaxation or suspension as quickly as practicable of a substantial number of WPB's L and M orders which now prohibit or restrict production and distribution. WPB will continue to limit the production of some goods requiring materials still in scarce supply.

7. Revocation of most of the conservation orders specifying the kinds of materials to be used in making certain products.

8. Some relaxation in the construction order L-41 to permit the most urgently needed civilian construction.

9. Take steps to insure that, where production is authorized on a restrictive basis, small business and new producers are given full opportunity to participate.

10. Introduction of a simplified priority system to replace CMP and other priorities at the earliest possible date.

11. Procedure for authorizing construction or production in certain local areas, as exceptions to nationwide limitation orders, to permit utilization of labor and resources which cannot practicably be used for war production or civilian manufacture not under limitation orders.

12. War Production Board will continue specialized controls over all materials continuing in tight supply such as tin, crude rubber, textiles, lumber and certain chemicals, to assure meeting all essential war and civilian needs.

Present, Past and Pending

■ SLOWDOWN RESULTS FROM NEW INCENTIVE PLAN

CHICAGO—Slowdown on the pickling line of Gary sheet and tin mill, Carnegie-Illinois Steel Corp., last week caused suspension of five workers. Dispute involves a new incentive plan providing for passage of 280 feet of sheet per minute through the pickling line compared to 180 feet under old method. Following a slowdown in March workers agreed to give plan a fair trial but since have resumed their dilatory tactics.

■ LOT OF 134 SURPLUS TOOLS OFFERED FOR SALE

WASHINGTON—Lot of 134 machine tools costing $1,123,990 and all over 10 years old, will be offered for sale April 24 by RFC at 70 Pine street, New York City. The tools will be available for inspection at the Watervliet Arsenal from April 16 to 21.

■ WILSON SAYS GM MAY BUILD CARS BEFORE YEAREND

DETROIT—Various divisions of General Motors Corp. might be able to build some passenger automobiles before the end of 1945 if the war in Europe ends this month, C. E. Wilson, president, stated last week. Resumption of production depends on manpower and materials supply which can be spared from the Pacific war effort.

■ BATCHELLER TO STUDY GERMAN STEEL INDUSTRY DISPOSAL

WASHINGTON—Hiland G. Batcheller, vice chairman and chief of operations, WPB, has been named chairman of a committee sponsored by FEA to decide what should be done with the German steel industry at the conclusion of the war.

■ MORE STEEL MADE AVAILABLE FOR BOX CARS

WASHINGTON—Army has turned back 34,000 tons of carbon steel from its second quarter allotment to the Office of Defense Transportation for construction of critically needed box cars. The tonnage will permit construction of 2000 cars, making possible completion of the scheduled program of 20,000 box cars for the first nine months of the year.

■ PLAN NEW CHAPTER OF LUBRICATION SOCIETY

CLEVELAND—Eighty-six representatives of industry in northern Ohio recently laid plans for organizing the Cleveland-Youngstown chapter of the newly-established American Society of Lubrication Engineers. Chapters have been formed in Chicago and Pittsburgh.

Post V-E Day Drop in Steel Seen

Steelmaking may decline 30 per cent. Much depends on speed with which government curbs on civilian production are eased

Slabs in the storage bay at the Carnegie-Illinois Steel Corp. at the Irvin Works, near Pittsburgh, are awaiting processing into ship plates. Cutbacks in ship programs may divert such steel to other uses, possibly for civilian goods

A DROP in steelmaking operations of possibly as much as 30 per cent may develop in the period following V-E Day before an upward swing sets in, some leading steelmakers believe. Much depends, they point out, on how quickly Washington acts in easing the L and M orders which would enable accumulated civilian requirements to take up slack resulting from cutbacks in munitions.

The extent of these cutbacks, as indicated by James F. Byrnes, before his retirement as director of War Mobilization and Reconversion, of 15 to 20 per cent in the first three months and about 40 per cent before the end of the year following the defeat of Germany, will be heavier than indicated earlier in the year, but not far below that predicted by the War Production Board early last fall at which time it was anticipated the European phase of the conflict might be over shortly.

J. A. Krug, War Production Board chairman, estimates 1,500,000 tons of carbon steel will be released from military requirements in the three months following Germany's collapse. He indicated that railroads, public utilities, oil producers and manufacturers of farm machinery will be first on the list of those to get increased steel allotments.

As applied directly to steel, the actual extent of the curtailments may be even greater than the proposed reduction in the munitions program, owing to the fact that much of the war requirements scheduled for production will be processed from materials on hand, thus creating a still lesser drain on new steel.

Interested in Pattern of Cutbacks

The steel industry will be greatly interested in the actual pattern of the cutbacks. Recently there was the reduction in the new Navy program (although this cut, as announced, was to relieve pressure on materials and manpower). Then a few days ago there was word that there would be a cutback soon in the small arms and ammunition program of possibly 40 per cent. But until the Army and the Navy provide some indication as to what action will be taken on heavy shells, which at present dominate the whole steel picture, there will be considerable question about not only various major products, but the extent of the tonnage likely to be involved. A sharp cutback in certain lines would have a relatively small bearing on steel from a tonnage standpoint, whereas a decided drop in heavy shells should have a considerable bearing.

A substantial decline in shells should greatly ease the situation in bars, tubing, rails and shapes, and also mean steel for other products. It would not only mean more steel, but a freeing of rolling facilities for normal production in some cases.

It would ease badly needed rail capacity and permit an early spurt in steel construction, assuming that restrictions on other materials involved in building work were lifted fairly promptly. Decline in ship work, as well as a drop in shell work, should also help the situation in building construction. For considerable time ship requirements have accounted for much of the work on the shape mills. Over recent months, however, the inroads of shell work, both as related to steel and facilities, have been increasing. For instance, one eastern shape mill has been devoting more than 75 per cent of its capacity to shell work.

The actual percentage of steel going into the heavy shell program has never been revealed, but it is substantial.

Other requirements of the war program of special interest to the industry are those pertaining particularly to sheets—such requirements as for landing mats, containers, oil drums, bomb and rocket components, and shelters. Today there is a marked stringency in sheets, with deliveries on certain items extending into next year. At the moment hot-rolled pickled sheets are particularly critical, because of inadequate pickling facilities.

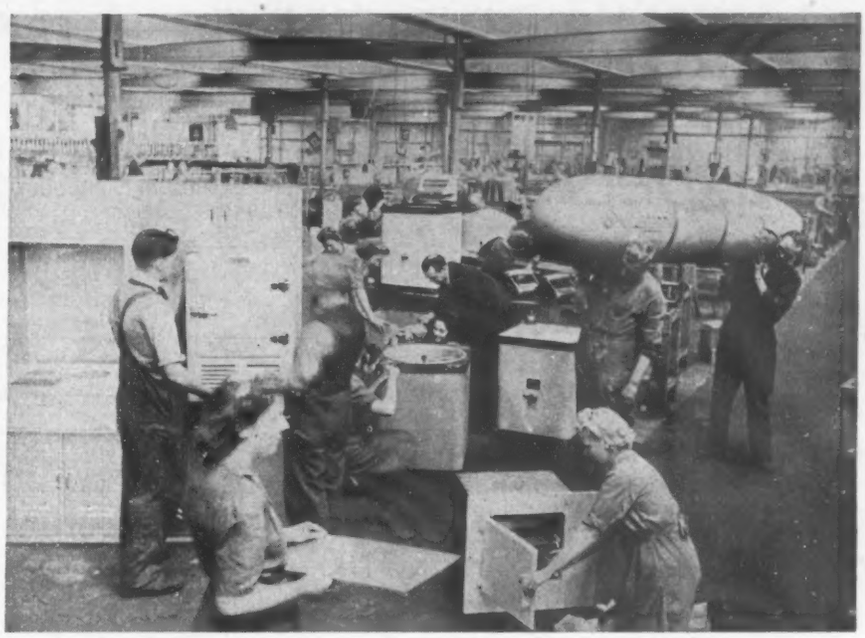
The relation of cutbacks to sheets, therefore, will be awaited with interest, especially because of the need for light flat products by the automobile industry and by makers of refrigerators and washing machines.

Materials available for the automobile industry are of prime interest, as this industry is considered by many to be the bellwether of all the steel consuming groups. As the automobile industry goes, so goes the steel industry, they declare. The feeling is, however, that it may be at least several months before production of automobiles for civilian use will get under way—and once it does there will be little question of demand, regardless of the season of the year. However, much will depend not only on the availability of steel but upon other materials and components important to the automobile industry, to say nothing of what the auto builders will be asked to do for the war in the Pacific.

Much speculation exists as to the amount of surplus steel likely to be on hand when V-E Day arrives. While under CMP regulations consumers' inventories were supposed to be limited to 60 days, it is believed stocks in the aggregate will run substantially heavier. The last time any official estimates were announced was early in 1943, steel men point out. Those estimates ran around 18,000,000 tons. It is the opinion of some leading interests that the total has not changed much.

Britain, U.S. Watch Other's Moves Closely

Keeping Allies in step on changeover to civilian goods production ticklish problem. Postwar foreign trade competition to be keen



Workers assemble prototype aluminum kitchenettes at the Burley Aircraft Products in England, which is in process of changing over to civilian goods manufacture. At right is one of the last emergency gasoline tanks for aircraft produced by the company. Photo from European

KEEPING reconversion planning of American and British industries in step is developing into one of the war's most delicate and complicated problems.

Manufacturers of both countries recognize the possibilities of the accumulated deficit in civilian goods, piled up during the years when their facilities have been devoted totally to war production. Interest in what competitors across the sea are doing is keen, although generally shrouded in official secrecy.

When the 4-point plan for limited reconversion of American industry was announced last summer by Donald M. Nelson, then chairman of the War Production Board, British government officials were flooded with inquiries about the program.

When news that a British aircraft or other war production plant has been released for civilian production leaks through to this country, or when the American government sells a large number of lend-lease machine tools to Britain, manufacturers in the United States are anxious to learn what the implications are.

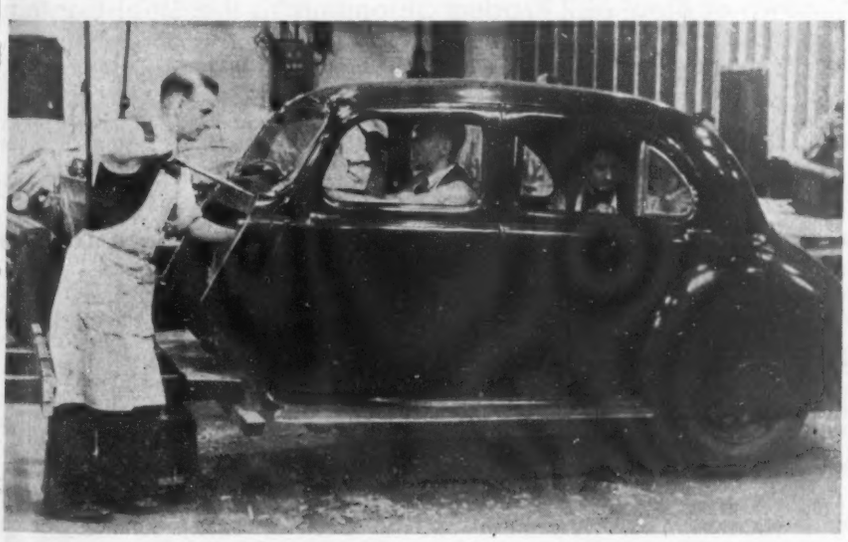
Actually reconversion to date has not progressed far in either country, although it is believed the British plans are further ahead than those in this country. Termination of the war in Europe and the release of some raw materials, facilities and manpower for peacetime goods will accentuate the problem.

Within recent months a start in switching over to civilian output has been made by British plants. More than 1100 British firms have been authorized to do experimental and development work on postwar models in the past eight months, according to the Board of Trade. Fifteen hundred British business men have been authorized to visit foreign markets and in many cases have taken orders.

The start made in U. S. reconversion last summer was quickly stamped out when the German counter-offensive started last winter and even talk about reconversion went underground, to emerge again only within the past several weeks. Actual production of civilian goods under the spot authorization program in the fourth quarter last year was less than 30 per cent of the amount authorized. The return to direct war production after the Germans' winter drive was more ruthless here than in the United Kingdom.

The Britons are especially fearful of competition from United States manufacturers in the postwar foreign trade markets. They note with alarm the tremendous wartime expansion of American productive capacity, the vast increase in our merchant fleet and the acceptance which U. S. goods have won in countries which the Britons formerly considered their spheres of trade. They compare the more than 90 million tons of steel producing capacity of the United States with their own 15 million tons, the 50 million tons of United States shipping with Britain's possible 15 million tons.

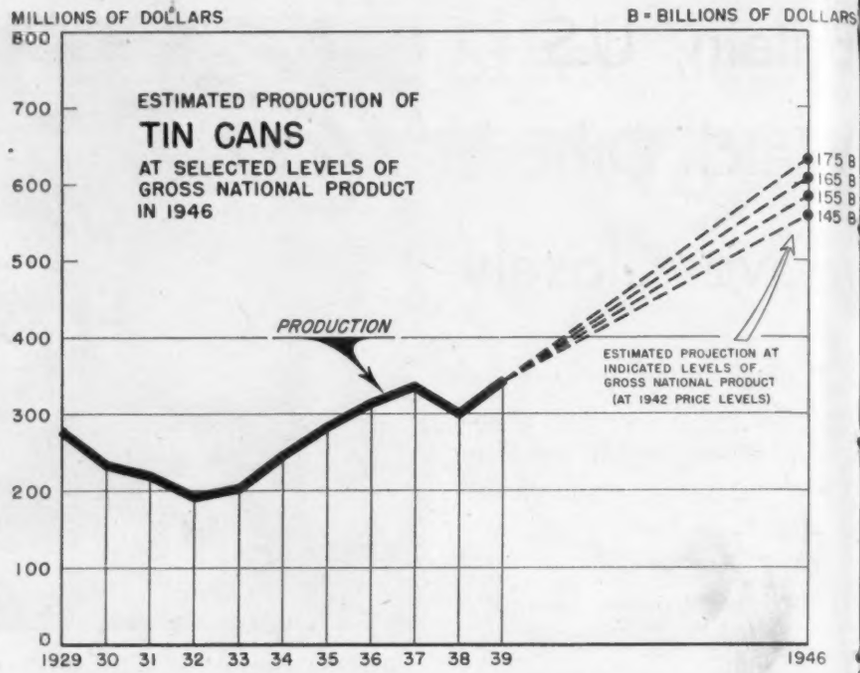
Britain must import to live, export or die. Highest priorities for the manufacture of non-war goods are to be given for those items which can be sold abroad. The British civilian population which has been on lean rations throughout the war will continue to live a spartan existence until they re-establish their foreign trade. Due to loss of substantial overseas investments and other sources of foreign exchange, they estimate postwar foreign trade must be 50 per cent above prewar.



Wooden prototype model of automobile nears completion in a British plant which formerly built armored vehicles. Photo from European

Container Prospects Promising

Postwar demand for cans and steel drums expected to reach new peaks. More food packaging and heavy exports seen



Projected postwar production of tin cans is expected to reach new peak levels, based on Department of Commerce estimate at different levels of the national product output of goods and services

DEMAND for tin-coated steel containers and steel drums is expected to reach new peak levels during the early postwar period. Since container inventories are at abnormally low levels, coupled with the trend towards increased packaging of foods and anticipated huge export requirements, some industry observers have been prompted to predict an increase of over 40 per cent in postwar steel container production compared with the 1939 level.

In the period 1929 to 1939 (latest official figures available) production of tin cans increased from a valuation of $278.1 million to $343.2 million, and in 1946 is expected to reach $559.6 million, based on a total national output of all goods and services of $145 billion, the Department of Commerce estimates. Based on the same national product output figure, production of steel barrels, kegs and drums are expected to total $88.2 million in 1946, compared with 1939 output of $54.1 million.

Distribution of steel to the container industry recorded a slight gain in 1944, estimated at 3,707,760 net tons. This compares with the peak total of 4,488,983 tons registered in 1941. Percentagewise the industry purchased 6.1 per cent of the total steel produced for sale last year, against 6.0 per cent in 1943. In 1942 and 1941 the percentage figures were 6.0 and 7.2 per cent, respectively.

Current allocation of steel to canmakers is not sufficient for the manufacture of the new cans permitted under the amendment to order M81, and might be insufficient for manufacture of some cans for military and essential food requirements, industry officials believe.

Military requirements for cans this year are substantially larger than last and are taxing the industry's facilities to the utmost. The armed services are specifying sanitary-type cans for the packing of a number of food items not previously packed in this type of container.

The War Production Board has allocated 591,500 tons of prime steel and 15,000 tons of rejects to can manufacturers for the second quarter, though the

Breakdown of Steel Mill Product Shipments to the Steel Container Industry

(Net Tons)

Products	1944*	1943	1942	1941	1940	1939	1938	1937	1936
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	49,200	27	416	1,957					
Structural shapes and sheet piling	600	9,419	3,785	2,276	518	4,063	4,097	1	804
Plates (universal and sheared)	74,500	38,266	39,726	15,532	91,476	20,762	70,799	24	32,884
Hot-rolled bars (carbon, incl. hoops and bands)	27,500	29,174	28,493	38,757	8,218				
Alloy bars	800	183	314	399	210				
Cold finished (carbon and alloy)	300	127	135	938					
Total bars	28,600	29,484	28,942	40,094	8,428	12,387	9,214	9	5,574
Pipe and tubes	900	2,783	852	857	438	1,744	170		123
Wire rods	100	318	1,041	100					
Wire and wire products (incl. fence posts)	101,400	98,199	93,209	91,450	43,308	39,373	26,268	26	32,876
Black plate†	313,300	231,717	258,797	195,699	128,554	2,320,843	1,503,783	2,309	77,634
Tin and terne plate (hot and cold reduced)	2,020,000	1,665,136	1,968,331	3,112,439	2,071,403				
Sheet and strip:									
Hot-rolled	800,000	1,128,953	890,681	847,465	538,699				
Cold reduced	270,000	276,717	251,020	99,538	36,339				
Galvanized	48,000	49,392	44,534	44,183	40,660	32,078	21,113	27	23,906
All other		1,989	6,042	3,446	6,392				
Total	1,118,000	1,457,051	1,192,277	994,632	622,090	688,506	442,154	691	595,900
Tool steel bars	60	105	399	380	35				
All other steel products	1,100	41,062	77,841	33,567	19,088	17,895	31,021	128	709
Grand total	3,707,760	3,373,562	3,665,616	4,488,983	2,985,338	3,105,462	2,077,488	3,190	746,505

*Estimated. †Includes tin and terne plate for years 1926 through 1939. Blank spaces indicate figures not available.

industry had requested more than 700,000 tons of prime plate for the period.

Substitute materials for tin-coated steel containers have been given impetus by the necessary controls placed on use of tin and to a lesser extent on steel for the manufacture of cans and drums during the war. However, practically all materials formerly packaged in these substitute containers are expected to return to metal packaging when steel and tin production is unregulated and supplies are ample.

Extensive experimentation is being carried out on the practicability of plastic containers but plastics are said to vary widely in their suitability for packaging. Experiments in packing a variety of foods in aluminum containers have been in progress for some time. Sharp reduction in the price of aluminum sheet in recent years has placed these containers in a stronger competitive position pricewise with tin containers.

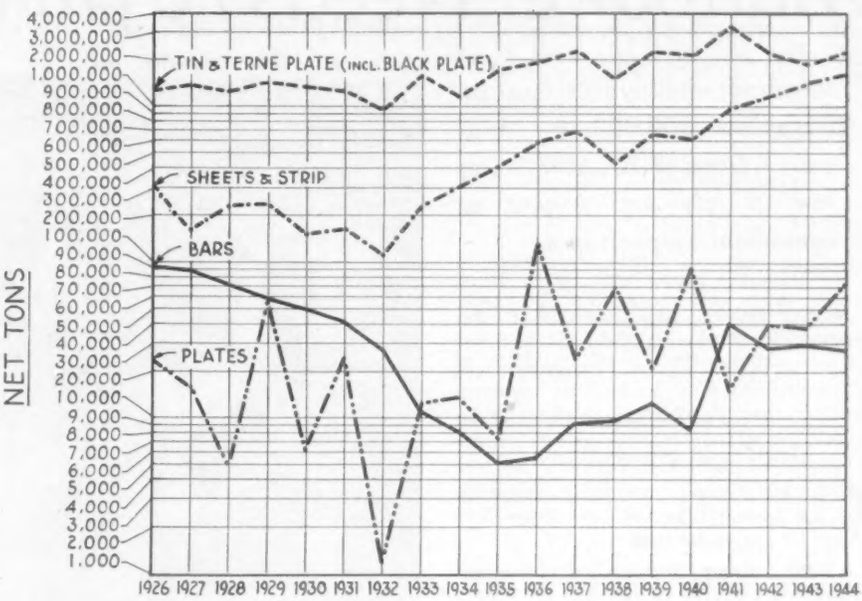
Lifting of controls on use of glass has placed manufacturers of this type container in an advantageous position to substantially increase production to meet current requirements and early postwar needs. A further advantage is seen in the expected delay in the return of tin supplies to normal, even after the freeing of Straits tin supply following V-J Day. Prewar output of tin cans was about double that of glass containers, but this spread has been narrowed during the war.

Tin-coated steel container manufacturers have been concentrating on the installation of more economical operating techniques to meet postwar demands and competition. The industry has tended to branch out into the manufacture of closures.

Electroplating of tin offers good postwar possibilities, especially for general-line cans. Electroplate for food packing is cheaper to produce but is said to be not generally as satisfactory as hot-dipped plate. Greater use of electrolytic plate depends on the improvement of the corrosion resistance of tin plate coatings by this process.

Today's tin plate capacity (including 5 per cent of terne plate) is about 5.9 million net tons, of which 2.2 million is electrolytic plate. Current operations on electrolytic lines are at 50 per cent of capacity, against 70 per cent on hot-dipped plate. Output of electrolytic plate last year totaled about 630,000 tons, with operations averaging around 30 per cent of capacity; hot-dipped at 1,993,000 tons operated near 54 per cent. Increase in electrolytic plate output was about 303,000 tons over the previous year, compared with 160,000 tons for hot-dipped.

CONTAINER INDUSTRY TAKES MORE STEEL IN '44



Army Halts Work on Smoke Shell Plant Just Starting

Army Ordnance Department at Pittsburgh has terminated the contract for construction of a 105-millimeter smoke shell plant at the Second Avenue mill of the Jones & Laughlin Steel Corp. Construction was in initial stages and no machinery had been installed when the Army called a halt to the work. The Ordnance Department offered no reason for calling off the project other than to say that it was ordered by Washington.

ntaindustry by Product Classification from 1926 Through 1944

(Net Tons)

19	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926
1	804	853	1,335	1,785	371	451	2	208	1,646	1,370	1,598
24	32,884	7,424	13,511	12,862	1,224	24,690	6,224	58,458	5,189	16,005	23,644
9	5,574	5,093	8,017	11,016	27,826	42,440	50,204	59,223	72,423	89,754	94,681
	123	1,182	13,761	486	566	637	495	788	681	561	44
26	32,876	25,885	30,359	29,036	15,717	45,285	25,947	36,393	33,243	32,752	18,906
2,309	77,634	1,718,923	1,168,471	1,595,579	962,742	1,262,743	1,375,987	1,431,846	1,234,295	1,342,279	1,294,633
27	23,906	23,808	18,987	15,480	7,277	8,260	8,495	16,152	11,014	9,374	
691	395,900	407,869	307,405	236,473	116,369	163,466	152,388	235,830	228,184	162,625	314,301
128	709	279	392	141	688	30	54,167	62,841	37,619	11,386	8,096
3,190	46,505	2,167,509	1,543,151	1,884,958	1,125,702	1,539,744	1,664,713	1,885,588	1,532,640	1,645,532	1,755,892

ures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute.

Manpower Needs To Hit Peak in June

Munitions employment must be increased 300,000 by mid-year. Drop of 100,000 to follow in July and August as armament output tapers

With the peak in labor requirements for the war program expected to be reached in June, manpower officials are warning that the time has not yet come for women to quit war plant jobs. Here, women workers are assembling aircraft wings in a Hudson Motor plant

MANPOWER requirements of the munitions and essential industries will not attain peak until June, War Manpower Commissioner Paul V. McNutt reported, stating that an "extra" push will be needed in getting more workers to leave nonessential industries for jobs in war production plants if production schedules for the six-month period from Feb. 15 to Aug. 15 are to be met.

Total military and civilian labor requirements for the period will be 1,500,000 persons, he said. Of these 900,000 will be required by the armed services. At present only 1,150,000 are available or in sight. The remaining 350,000 must come from among workers now employed in less essential industry, from more extensive use of war prisoners and foreign workers, and by encouraging more women to take war jobs.

The acute need for additional war workers persists despite the fact total civilian employment in February, 1945, was 300,000 higher than in the like month a year ago. Much of this increase has been in less-essential jobs.

Expectations are that some 350,000 discharged veterans will be available for the work force in the period, while 300,000 trained workers from the shipbuilding industry will be available as new construction schedules are declining in that field. Another 500,000 may be expected from normal additions to the labor force.

Munitions Increase Sought

Current production schedules call for acceleration of munitions output in second quarter, with June production approximately 10 per cent above the levels attained in January and February. In the third quarter, however, demand will taper off 2 per cent below June demand. New ship construction will be the principal item on the declining schedule after June.

Achievement of the production now scheduled for the six-month period from February to August will require that present employment levels in the munitions industries be increased by almost 300,000 by June, 1945, followed by a drop of almost 100,000 in the following two months. Total employment in these industries then will total 9,300,000. Ammunition, combat and motor vehicle industries will require 200,000; electronic and communications equipment group, 50,000; aircraft, 60,000; ship repair, 70,000 and basic materials, rubber and general components, 50,000.

By August the only new needs will be 50,000 for the ammunition and combat vehicle group and 10,000 each for ship repair and aircraft. Declines are scheduled in new ship construction, where 130,000 workers will be dropped by June and another 170,000 by August. Communications and electronic equipment industries will require 30,000 fewer workers in August than in June.

Ordnance output is scheduled to rise 20 per cent between February and August and a major portion of increased labor needs in the munitions industries will be concentrated in this category. At least 230,000 more workers will be needed if schedules are to be met.

Employment in the aircraft industry rose by about 20,000 in January but dropped 5000 in February. Schedules for the next six months call for a monthly increase of 10,000 workers until the peak is reached in August. At that time, if schedules are to be met, it will call for a total employment in the industry of 1,750,000, about 70,000 more than now.

Employment in the communication and electronic equipment industries must rise by 50,000 by June but by August the peak will have passed and employment requirements will total only about 20,000 above the present level.

During 1945 the net increase in the working force is not expected to maintain the continual growth that marked the entire year ending in February. By August, with this year's production peak passed, it is expected that the civilian labor force will be the same as that of August, 1944.

Levels of munitions plant employment achieved in December were maintained in January and February, Commissioner McNutt reports. This, he said, represents a positive betterment in the employment situation because while the overall employment level has remained steady, workers released from declining war programs have been channeled in large numbers into plants producing "must" items.

Mr. McNutt said that February marked the first month since July, 1942, that the number of persons in the civilian labor force was larger than that of the same month in the year preceding. Whereas in the same 12-month period the net increase in the armed services was 1,300,000, this was more than offset by an increase in the civilian labor force, from 51,100,000 in 1944 to 51,400,000 in February, 1945.

Munitions industries employment showed substantial gains generally during the first two months of this year. In the period 30,000 workers were added to plants on the "must" list producing ammunition, tanks, motor vehicles, and other critical items. Other employment gains noted included 15,600 in heavy ammunition; 7500 in "must" aircraft items; 5200 in naval establishments for fleet repairs; 3000 producing tanks and 2600 in steel plants.

Miners Disregard Truce; Strikes Cut Steel Mill Output

Many mines closed despite agreement to extend contract for 30 days. Blast furnaces banked. Bessemers down

A WAVE of strikes swept through the Appalachian soft coal mining area last week, closing many mines and interrupting production of pig iron and steel at a crucial stage of the war.

The work stoppages occurred despite an agreement by John L. Lewis, head of the United Mine Workers, to keep the miners at work until May. 1. Representatives of the union and the coal mine operators are conducting negotiations in Washington for a new collective bargaining contract.

Effect of the mine strikes was quickly felt by Pittsburgh district steel mills last week. United States Steel Corp. reported eight blast furnaces had been banked by Thursday and six or seven more were scheduled to go down later in the week. Mining operations in the Uniontown district where the corporation obtains its coking coal were down to 8 per cent. The Clairton coke works was scheduled for a sharp reduction in operations Friday, which would be immediately reflected in lower steel mills operations due to shortage of gas for fuel. Bessemer steel output was halted at the Edgar Thompson Works, causing a daily steel loss of 4000 tons.

Coal mines of other steel producers were affected but stocks permitted operations through last week.

An estimated 21,000 miners in the Pittsburgh district were idle at midweek. Roving bands of pickets, armed with pistols and shotguns, were reported helping keep the mines closed.

Senate Rejects Manpower Bill by Vote of 46-29

Prospects for enactment of manpower legislation were considered nil last week after the Senate rejected 46 to 29 a conference report on the pending bill. The measure was sent back to conference with the House, but observers predicted no agreement on the legislation would be reached.

Administration pressure for the bill's enactment continued until the last, although organized labor and various management spokesmen opposed it. The resignation of James F. Byrnes as director of the Office of War Mobilization and Reconversion whose influence had held some wavering votes in line.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

CMP REGULATION

ALUMINUM FOIL: Direction 7, CMP regulation 5, issued April 4 covering aluminum foil for wrapping. (Direction 7, CMP reg. 5).

H ORDER

COLLAPSIBLE TUBES: Short lead supply makes necessary further restrictions on use in collapsible tubes, the WPB issuing a sweeping revision of conservation order M-115, effective April 1.

L ORDERS

STEEL DRUMS: Base period for calculating quarterly usage of steel shipping drums advanced from the corresponding quarter of 1943 to the corresponding quarter of 1944 in a complete revision by WPB of limitation order L-197. The order was simplified and its phraseology changed to correspond with other current Containers Division orders. The amended order became effective April 1. (L-197).

USED STEEL RAIL: Amendment to order L-88 tightens controls over sales of all grades of used steel rail other than those to be used for laying track. Sales of used rail of relayer grade may be made, (1) by common carriers directly to industries for the purpose of laying track, without restriction and without certification, (2) to any person, other than dealers, without prior authorization, provided the purchase order is certified to the effect that the rail is to be used for laying track, and (3) to dealers without authorization, provided the dealer's purchase order is certified to the effect that the rail is purchased for subsequent resale in accordance with order L-88.

Any amount of used rail of relayer grade in excess of 10 tons to be sold in any calendar month for any other purpose requires prior authorization from WPB. The new restrictions also bring the Army, Navy and Maritime Commission within the scope of the order.

LAWN MOWERS: Amended order L-67 permits authorization to make hand lawn mowers for special orders as defined; provides for appeals. Related from WPB-1477. (L-67).

M ORDER

LEAD: Effective April 4, amended order M-38 restricts use of lead or lead products except as specified on List 1; provides for obtaining pig lead from Metals Reserve Co.; restricts sale and delivery. (M-38 amended).

PRICE REGULATION

OIL COUNTRY TUBULAR GOODS: Holders of excess stocks of oil country tubular goods have been authorized by OPA to include in their selling prices to users the transportation charge the holder paid or would have paid a commercial trucking company for hauling the goods from the nearest railroad siding to the place where the stock is held. The hauling charge may be included in the selling price to a consumer only when the material is resold in substantially the same form as received, and is included only in sales of oil country tubing, casing, drill pipe and drive pipe; trucking charges on line pipe still must be absorbed by the holder in resales.

POSTWAR PREVIEWS

RECONVERSION— With V-E Day "not far distant," plans for curtailing munitions production and gradually resuming civilian goods manufacture are unfolding. See pages 75, 77, 78.

CONTAINERS— Prospects for tin-coated steel containers in postwar period considered good, especially for heavy volume packs. See page 80.

PLANNING— Several plans should be prepared to fit postwar conditions. Company policy should be flexible. See page 88.

WEST COAST— Postwar utilization of war-born plants offers challenge to western business men. See page 97.

AIRCRAFT— Continuing research and development in military aircraft urged as insurance against being caught unprepared in future and keeping industry in healthy state. See page 98.

SPONGE IRON— Hope of metallurgists for eventual production of "direct steel" heightened by Bureau of Mines studies for utilizing domestic ores. May foreshadow important postwar role for sponge iron. See page 106.

CENTRALIZED LUBRICATION SYSTEMS— Remarkable savings achieved by centralized lubrication systems engineered to suit individual applications. Systems seen readily adaptable to variety of tomorrow's production tools. See page 110.

PROCESSING AND PACKAGING PARTS— Radical changes in materials and procedures for preservation and preparation of parts and finished products point to less costly, more satisfactory shipping and storage methods in future. See page 133.

Political Peace, World Commerce To Be Aims of 'Frisco Conference

United States representatives will seek to include agreements reached at Chapultepec in charter of General International Organization. Inter-American pact may operate within forthcoming world-wide arrangement

GROUNDWORK on which to build a substantial volume of foreign trade, as well as to pave the way for political stability in the world at large, is expected to be laid at the conference of United Nations representatives in San Francisco April 25. In drafting the charter of the General International Organization, the United States representatives will seek to extend the agreements reached with the other Americas at Mexico City in March to all the United Nations.

This hope is based not only on the principles adopted at the Dumbarton Oaks conference, but on the program actually agreed upon in the Act of Chapultepec and signed by delegates of the United States and some 20 Latin-American nations at Mexico City. The Act of Chapultepec, as explained to the Senate by two delegates, Chairman Tom Connally (Dem., Tex.) of the Foreign Relations Committee and Sen. Warren R. Austin (Rep., Vt.), a committee member, is regarded by these two spokesmen as a "forerunner of what we hope will happen at San Francisco; this is a beacon which shall enable the states at San Francisco to see the roadway to peace."

Clear-Cut Hemisphere Program

They made it clear that the inter-American agreement reached at Mexico City was intended by the signatory nations to operate within the forthcoming world organization, integrated into and co-ordinated with the latter; also that the United States and the vast majority of the Latin American countries will go to San Francisco with a clear-cut hemisphere program. Senator Connally described the Act of Chapultepec as "an epochal document which shall mean peace and security in the western hemisphere for years to come, and a great influence toward guaranteeing that aggression and conquest shall be chained."

In other words, the overwhelming majority of the nations in the western hemisphere have reached an agreement based on principles previously approved at Dumbarton Oaks; they intend the hemisphere agreement to be an integral part of the larger agreement sought at San Francisco, and they represent an important world segment of foreign trade potentialities after the war. It is believed likely, therefore, that the example set at Mexico City will exert great influence over the deliberations at San Francisco. That is, the economic decisions reached at Mexico City should influence the economic decisions which now are to be made in terms of the world.

For this reason a complete English translation of the Mexico City proceedings which has been completed by the State Department is of special interest to United States businessmen, especially those whose postwar planning is based, at least in part, on foreign trade potentialities. Many articles of agreement were drawn up with the definite purpose of improving still further the economic relationships of the Americas—of increasing, in fact, their interdependency. Others were drawn up with purely political aims in view, but these, too, were of a character that automatically should make for smoother business relationships.

For example, immediately following a resolution to lay a floral wreath before the statue of Benito Juarez, "hero of the Americas," is the one alluded to by Senator Connally as a "multilateral doctrine" and described by Senator Austin as reversing "the doctrine of noninterference in the external affairs of another state."

The American republics, this resolution reads, constitute a special entity due to their geographic conditions, the similarity of their institutions, and their international obligations contracted at various inter-American conferences. "The republics of this continent," it goes on, "have declared their solidarity to the extent that any threat or attack against one of them constitutes a threat or attack against all. The existence of a permanent military agency for the study and solution of problems affecting the western hemisphere is indispensable," it reads, and then outlines the composition of a strong Inter-American Defense Board to be formed "at the earliest possible time."

Business Would Be Spurred

This one article alone, a delegate who attended Mexico City says, will result in a good deal of industrial activity which will be involved in providing armament for hemisphere defense. It also should bring about close contact between government representatives, and between manufacturers, engineers and technicians of the various countries and thus encourage trade in general.

A few pages later comes a resolution providing that the program set up at Mexico City will be reviewed from time to time and kept alive and keyed to the times. This sets up a schedule of definite meetings, including international conferences of delegates of the American republics, meetings of the ministers of foreign affairs or their alternates, conferences of the governing board of the Pan American Union, etc. This resolution defines the responsibilities to be carried out at the meetings of these bodies.

Then follow a number of resolutions

A group of delegates to the Inter-American Conference in Mexico City. Left to right in foreground are: Enrique Munoz Meany, delegate from Guatemala; Nelson Rockefeller, U. S. State Department (directly behind Meany); Secretary of State E. R. Stettinius; Pedro Leao Velloso, Brazilian foreign secretary; Adolph Berle, U. S. Ambassador to Brazil; George Messersmith, U. S. Ambassador to Mexico. NEA photo

of a purely economic character which amplify the two following basic principles.

"Economic collaboration is essential to the common prosperity of the American nations. Want among any of their peoples, whether in the form of poverty, malnutrition, or ill health, affects each one of them and consequently all of them jointly.

"The American states consider as necessary the just co-ordination of all interests to create an economy of abundance in which natural resources and human labor will be employed for the purpose of raising the standard of living of all the people of the continent."

One of the economic resolutions calls for wider use of price ceilings, and for closer contacts, "to protect the economies of the nations of the western hemisphere from inflation and other dislocation arising out of war conditions."

Another deals with shortages of machinery and other equipment, and of manufactured goods, due to necessary priority of war needs. This resolution reads:

"As soon as the war demand diminishes or ceases, the nations which produce machinery, tools and manufactured goods should make available such goods to the other American nations on a fair and equitable basis, and within the limitations of the control mechanisms existing at the time, in order that they may achieve the renewal of equipment and material worn out by intensive operation in connection with the war effort, and the execution of programs for agricultural, industrial and transport development postponed during the war and necessary for strengthening the economies of such countries and for raising the levels of living of their peoples."

To Consider Financial Needs

One resolution has to do with the Inter-American Technical Economic Conference to convene in Washington June 15 of this year; it urges all the signatory nations to prepare as complete information as possible on their economic and financial needs for discussion and action at the conference.

Another has special reference to relaxation of wartime controls when that becomes possible, and calls for rationing exports of "tools, machinery, raw materials and essential consumption goods," by the nations now employing restrictions, "on a fair and equitable basis, and in as large amounts as are compatible . . . , to the other American nations, in order that the latter may develop efficiently their productive activity, especially that which relates to the establishment of new industries, the renewal of the equipment of existing industries, the improvement of transportation, and the supply of normal goods for essential consumption."

An important resolution whose details require future amplification deals with measures for preventing a collapse in western hemisphere economy immediately after the war. It is necessary, this resolution provides, that nations to be affected by procurement terminations must formulate appropriate plans, "as far in advance as the uncertainties of war permit, so that each country shall enjoy the maximum of time for its readjustment in connection with reductions in the procurement of basic products and strategic materials for war," and "all efforts shall be made to attain, as rapidly as possible, the re-establishment of normal commercial trade." This resolution calls for free co-operation among the countries involved, and suggests, although it does not specifically mention, the possibility of delayed and gradual tapering off of war procurement to prevent undue economic shocks.

Another resolution calls for free access to information, by each signatory nation to its own people, and by the various nations to each other, "oral or written, published in books or by the press, broadcast by radio or disseminated by any other means . . . . without need of previous censorship."

Economic Stability Sought

Another resolution provides for agreements between producing and consuming countries involving those products in which burdensome surpluses have accumulated, or threaten to accumulate, "these agreements to be open to participation by all interested countries in the world." Purpose is "the maximum remuneration for the workers in producing countries . . . . assuring those countries remunerative and non-discriminatory prices based on internationally accepted standards of quality; stability of supply and maintenance of equitable prices for consuming countries; and the adjustment of production towards other more economical activities." The proposed agreements would also "reduce returns to middlemen" eliminate "undesirable speculation," and prevent disparity between prices of primary products and those of manufactured products.

The Act of Chapultepec contains a lengthy resolution entitled "Industrial Development," which sets forth the principles under which the American republics are to assist in each other's industrial development. This frowns upon attempts to seek to enable industries to live through high customs protection; this would be prejudicial to the interests of consumers. To facilitate financing of industry, the American republics will undertake to ratify, as soon as possible, the Bretton Woods plans for establishment of the International Bank for Reconstruction and Development, and the International monetary fund. The resolution provides that those American republics possessing abundant supplies of capital will make ample credits available at long terms and with equitable rates of interest and amortization, to the other American republics; it provides also that liberalization of credit for American countries shall have an important place on the agenda of the coming Inter-American Technical Economic Conference.

This resolution provides that investment of foreign capital in private business enterprises of a nation must not prevent private business of that nation from participating to the extent of its own capital investment ability. It reaffirmed the Atlantic Charter principle of equal access to all raw materials, provides an arrangement under which technically trained personnel will be made available to the various countries, and recognizes the desirability of facilitating reciprocal use of patents.

The general sense of the above resolutions is repeated and summarized in a long resolution entitled "Economic Charter of the Americas." It contains some noteworthy articles; one of them warns against the harmful effects that often result from selfish economic nationalism; still another upholds private enterprise as the system "which has characterized the economic development of the American republics," and calls for appropriate steps to encourage private enterprise.

One of the really significant resolutions in the Act of Chapultepec is a Declaration of Social Principles of America," which proclaims in high-flown terms that "man must be the center of interest of all efforts of peoples and governments," and that the American nations will "undertake to combat . . . . poverty, malnutrition, sickness and ignorance, energetically and decisively." This resolution calls on the American republics to ratify the principles adopted at the various international labor conferences. It calls for general ratification of a minimum living wage, an adequate social security system, adequate maternity benefits and protection, recognition of the right of workers to organize.

Senators Are Questioned

Following the Mexico City conference, word was circulated around Washington that not all the agreements made there had been publicized. These rumors caused various senators to question Senators Connally and Austin whether any decision has been reached involving reductions in our tariff rates, policies of restriction to prevent dumping of surpluses into world markets, or agreements whereby the United States would employ subsidies in implementing its future trade with the Latin Americas. Senators Connally and Austin admitted that such matters had been discussed, but that no agreements resulted.

In general, it is expected that the United States program to be advanced at San Francisco will be to a large extent a proposal to extend to the Allied Nations and all friendly nations of the world the very same arrangement into which we entered on a more limited scale at Mexico City. That arrangement, as indicated above, is devoted mainly to setting forth principles which, in the main, are of an idealistic character, and which adhere to principles that have been thoroughly ratified.

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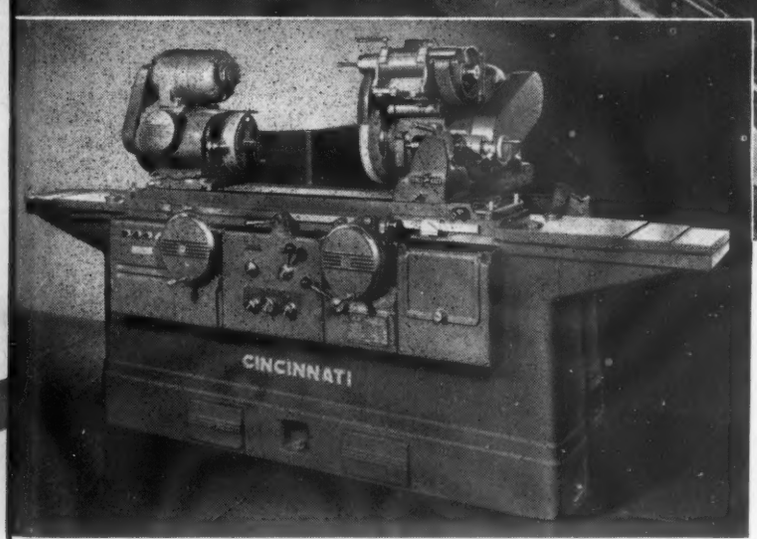

Above: Grinding the shank end of a long gun boring drill on a 12" Hydraulic Universal. (Catalog illustration shown at the left.) These grinders are available in 12", 14", 16" and 18" swings; and 36", 48" and 72" between-center lengths. Catalog G-486-1 for 12" or G-474-1 for larger machines will be sent on request. A brief description of these machines is given in Sweet's Catalog File.

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Approach to Postwar Planning Influenced by Varying Factors

More than one program seems necessary with problem facing industry one of many facets. Company policy should be flexible to provide for basis of operation under extremes of accelerated demand and slow consumer response

By E. QUIMBY SMITH

THERE are at least two schools of thought regarding the postwar period. Some feel we will enter a period of prosperity exceeding anything experienced before. Others think almost the exact opposite will happen; that in spite of pent-up demand and increased savings, people, for fear of unemployment, will be slow to spend money. With this wide difference of opinion, there exists sufficient reason for developing a postwar plan or plans for each company, since obviously, no one plan could provide for a basis of operation under both of these extremes.

However, there is another reason which makes postwar planning a necessity. It is the opportunity to capitalize on a situation that has not occurred during the life of any existing company. It is the opportunity to make, literally, a fresh start. Most companies can trace their history back to a rather modest beginning. Ancestry may disclose consolidation and merger upon merger, but always growth and more growth with little time for self examination. This may not be true in every case, but you will not find a period when a company has had the time and the opportunity to plan so completely.

Opportunity Varies

This opportunity varies, due to the degree in which a company was able to convert to the war effort. Some companies had to make little or no change. Others were forced to make varying degrees of changeover. Then, there was that group of companies which not only had to make entirely new products, but which also had to remove equipment and entirely re-equip plants, using only their prewar organization and buildings in their new work.

The real necessity for postwar planning is not only to capitalize on the opportunity of making a fresh start, but also to seize the occasion to make use of the tremendous technical advances in industry during the war period.

Can a company safely assume its prewar market will be unchanged? Can this same company assume its product will be in comparable position in its industry in the postwar market as it was in the prewar market? Can it assume that war tested methods of manufacturing applied by a wide-awake organization will not produce the same product for less money, or a better product for the same money? If the answer is "no" to any of these questions, then there is the necessity for formulating not a single postwar plan, but at least two, one to function if tremendous prosperity is ahead, one if depression is ahead. The better part of good judgment will probably force a third plan half way between the first two.

NOT ENCOURAGING

Maj. Gen. Philip B. Fleming, administrator of the Federal Works Agency, in New York recently disclosed that of $1 billion in ready postwar public works projects tabulated by his agency last year, only some $600 million actually proved on detailed inquiry to be suitable for early action. Similarly, of 4000 projects left over from the Works Project Administration, some have since been constructed and there is no great volume left.

He thought public works projects in many states may be impeded after the war ends by outmoded and inadequate state and local statutes and thought that civic groups throughout the country should direct prompt attention to this situation. Counties in many states, he said, do not have the legal authority to build even such essential projects as general hospitals.

Consider some of the war developments which will probably carry over into the postwar period. In the basic industries there is a newcomer in the form of magnesium in sufficient volume to be taken into consideration. Other metals have appeared resulting in revision of production practices. Then too there has been a large increase in aluminum production and this metal most certainly will find outlets in new fields. Paper is combined with resins under pressure with a resultant strong product with certain advantages. Steel fabrication practices have been greatly improved. Synthetic rubber cannot be discounted in the postwar competitive markets.

These basic developments point to pronounced changes in our everyday life. Improved styling of automobiles with new power units due to higher octane gasoline along with many other improvements will undoubtedly keep this form of transportation ahead of aircraft competition although we can look to a much larger postwar production than prewar in the aviation field. Household appliances probably will be streamlined and combination units of refrigeration, stoves and sinks, all built at table height will be in the new homes of the future. Large markets for prefabricated homes not only in war torn countries but in the elimination of slum or blighted areas in all of our cities are certain. These are but a few of the many changes that make postwar planning necessary.

The approach to this problem of postwar policy might be made by any one of several methods, but the simpler the plan, the better. The method outlined here does not attempt to consider more than minimum requirements and can be expanded to take in as many phases as desired.

Section I of this analysis deals with the three fundamentals of business: a) Products; b) Organization; c) Finance.

Each of these should be examined in the light of postwar planning.

First as to the product: It is necessary to answer these questions. 1) Will the prewar product carry over to the postwar period? 2) Will re-design of the product be necessary either from the sales angle or changes in manufacturing technique? 3) Should any other product be added to the picture?

Questions About Products Important

These questions as to product are of vital importance because the product or products are the keystone of the whole problem. If it is advisable to add a new product, then the question of what field to enter immediately presents itself.

There probably will be many failures due to lack of complete market studies. For instance, in one field in which, prewar, there were approximately 60 manufacturers with 14 doing the major portion of the business, it is rumored several more companies are seeking to enter the field. On market survey, this industry is supposed to show a 100 per cent increase in potential business. It is logical that at least some increase in manufacturing capacity may be justified. Of the companies planning to enter this field there are those doing some wishful thinking when you consider they are spotting the prewar companies 10 to 15 years experience and a ready-to-go marketing organization.

In considering additional products the outlay of cash necessary for equipment, plant facilities, if necessary, and the cost of getting into production and the advertising needed in connection with a new product must be checked with the financial picture. A new product which utilizes some of the equipment, past

manufacturing processes or some of the existing distribution channels is advisable.

In deciding on new products it is assumed that all plans are made to build as near as possible a depression proof business. If the present product is a one or two industry product or of a limited market nature, then it is advisable to add another product to broaden the base, even to the extent of consolidating. It certainly is advisable to have one product that at depression level of operation would earn enough to cover the break-even point. This would then be classed as the bread-and-butter end of the business and additional products would tend to add profits both in periods of depression and prosperity, especially if they added additional industries on the books of the company.

The second step in Section I is that of looking at the organization and analyzing it for possible improvement. This examination should be done in light of the job to be done. Ordinarily the results obtained are in direct proportion to the aggregate ability of the group as a whole, all other things being equal.

Is the organization chart up to date and does each executive know exactly for what he is responsible, and has the necessary authority been delegated to him? This is a routine checkup but one that probably has been neglected during the war. In a great many companies it is found too often that the company has created a place for the man instead of obtaining a man for the position. An organization for example, might be weak in personnel in one of its three fundamental functions of sales, manufacturing or finance, with the other two individuals helping to carry the load. To the extent it is weak, the final results will eventually be curtailed. This holds true, whether the company is small, medium or large, although the smaller the company, the heavier the penalty.

Limited by Capabilities of Executives

Many companies that have grown from rather modest size to larger proportions, find certain of their executives have reached the limit of capability. An organization starting out cannot afford to have top flight executives in each position and as time goes on, if changes are not made, the corporation is limited by the original individuals. In reviewing the organization, for change, one should also review it for additions. During the war many companies have grown so quickly and there has been such a shortage of manpower, staff jobs have not been filled.

There are many companies who do not have a director of research or anyone heading up that function. Likewise, there are too few with personnel directors or controllers. These men should be added as soon as the company reaches a point justifying their employment. A well managed research department not only can justify the expense but can do a great deal toward keeping the company near the top of its field.

The field of personnel work will probably become more and more important as time passes and it will be necessary to develop better labor contracts and better procedures of negotiation.

The office of controller is becoming more important in up-to-date management. It is here that figures are analyzed and interpreted for the company from the foreman to the board of directors. Through this service with the right man, co-ordination becomes complete. In the larger companies where these positions already exist the duties are subdivided and assigned to staff assistants. These staffs should be reviewed to see that the best available talent is employed and applied in the proper place. A company is never standing still in the long time picture. It is either advancing or receding and this depends largely on the organization and its complete co-ordination.

Analyzing Financial Position

The third and final phase of Section I is analyzing the financial position of the company. What is the current position and what will be the position after final renegotiation and contract terminations? Will the company need additional capital and if so, how much and when? What method should be used to raise this money? Is the present capital structure in the best possible position? In giving consideration to this phase there is an additional method to consider in addition to the prewar methods of raising capital and that is the wartime agency organized by the government for aid to the smaller companies. It is quite possible that private bankers will have something to offer along these lines by the time the war is over. Thought also should be given to merger and consolidation. Some of this has already been accomplished in certain parts of the country and undoubtedly a great deal more will follow.

This briefly reviews the first three steps of product, organization and finance, constituting Section I. Section II likewise consists of three phases, namely: a) Manufacturing; b) Sales; c) Accounting.

Plant facilities available should be checked in the light of the proposed product or products to be manufactured. Is the plant suitable as to size, possible new methods, location as to raw material, labor supply? Is the plant layout according to latest practice? Will it insure production of the lowest unit cost? What retooling is necessary, and is the company financially able to undertake this? It is essential in making these plans to constantly cross-check in order to develop a sound postwar plan.

The second step of Section II is that of sales. The prewar market, method of distribution, sales promotion campaign and advertising program should be carefully weighed to see what changes should be made for the postwar era. The use of outside competent counsel when such counsel is not available within the organization is recommended. Market studies of both domestic and foreign fields should be made. It will not be advisable to merely revise old sales quotas because of redistribution of the population due to the war. This certainly will make for dislocated markets in the postwar period. The war has undoubtedly changed the habits of the people of the nation. It will probably be more of an out-of-door nation than ever before and this will apply not only to the hours of recreation but also will be manifested in the type of homes and furniture of the future.

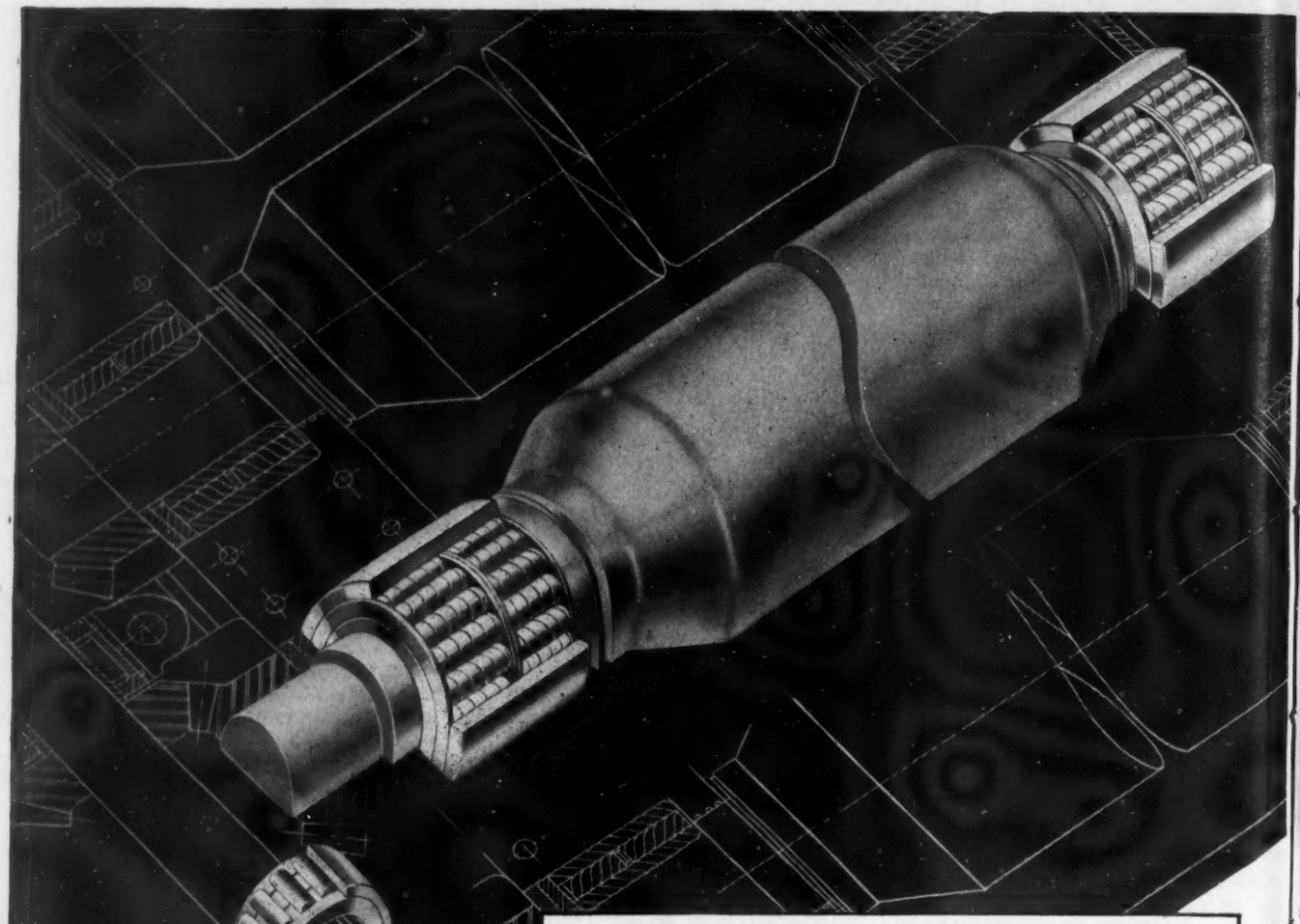
The third and final phase of Section II of the overall plan is the accounting set up. It will probably be more clear than ever that to stay in business one must know his costs. Not only will accurate costs be necessary, but a budgeting control plan should be installed to allow for shifting from plan one to plan two or three or back as the case may be.

It cannot be taken for granted that because of a go-ahead by the War Pro-

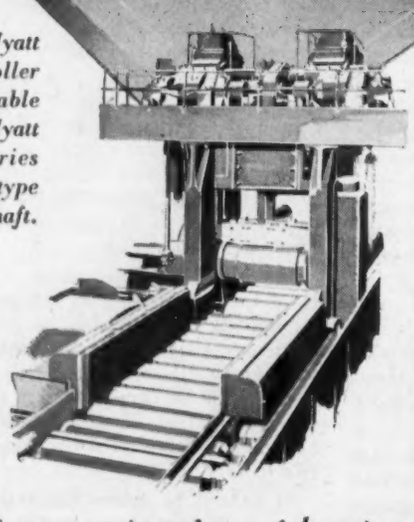
(*Please turn to Page* 188)

E. QUIMBY SMITH

Well qualified by years of experience in industry and finance, Mr. Smith in the accompanying article discusses the all-important problem of postwar planning, especially as it concerns small companies. Mr. Smith for the last 15 years has been vice president of the Bundy Tubing Co., Detroit. For ten years prior to his association with the Bundy company he was in the banking business, serving as cashier, vice president and president. He is co-author of "Cost and Production Handbook," published by Ronald Press, and is a member of the American Iron & Steel Institute and the Controllers Institute of America.



Showing Hyatt Wound Roller type on Table Rolls and Hyatt 70,000 Series Solid Roller type on Line Shaft.



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HARRISON, NEW JERSEY

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Automotive industry's position on reconversion unchanged, despite revived plans for changeover. War production placed first, but manufacturers believe they should be free to make engineering preparations, purchase tools, dies, fixtures

DETROIT

PLANS, plans and more plans for the coming reconversion of auto plants to car production are the order of the day.

The WPB has a plan, or maybe several plans depending upon which WPB official is involved. The Army has a plan, the industry has a plan, all God's chillun got plans. The principal trouble is there are too many plans, not enough plants.

J. A. Krug, WPB chief, was due here late last week to converse with industry leaders about the problems incident to reconversion and pre-reconversion. Arranged at his request, the meeting originally was supposed to have been very much off the record, with no reporters or correspondents on hand. As usual, however, the news leaked out in Washington a week ago, and even before Mr. Krug had arrived, the news dopesters were giving the go-ahead to some motor companies to resume automobile production.

The industry's position is simple, and it is unchanged from what it was a year ago or six months ago. Essentially it is this: The entire automotive group recognizes the vital character of war production and obviously will do nothing to disturb the steady flow of materiel on present contracts. Beyond this basic responsibility, the industry feels it should be free, or on an individual company basis to pursue to the greatest length possible preparatory work, including engineering, purchasing of machine tools, dies, fixtures, etc. Just as was the case last November when the industry documented its pre-reconversion recommendations, there is a host of barriers to this work. These must still be removed to achieve maximum results in resumption of production.

7500 New Machine Tools Needed

Roughly 7500 new machine tools are needed, but are accorded no priority and must be shuffled back of military, lend lease, foreign rehabilitation and a dozen other categories or rated requirements on builders' order books. Some scattered pre-reconversion activity has been possible, principally in respect to tools and dies, under MRO (maintenance, repair and operating) orders which give priority to material in these categories, based on a percentage of total rated and unrated business. However, there was recently placed in effect a substantial reduction in this percentage, due to an alleged material shortage springing from accelerated military programs, and this cutback was based on combined rated and unrated business, which is not believed entirely fair, since few plants have been able to give as much as a glance at unrated orders.

A considerable segment of opinion here is leaning to the belief once the Germans have capitulated there will develop within the WPB regional and Washington personnel the wildest scramble to "go home" that could be imagined. Hundreds of men formerly associated with business and industry, who have been giving freely of their time and effort during the war emergency, are believed toeing the mark for quick sprint back to their respective businesses, leaving the WPB in a catastrophic mess as far as administering any reasonable control of the reconversion processes. Some believe this may be a good thing that it may herald a return to an unmanaged economy, even if its initial phases are marked by utter confusion.

The conclusion appears more certain every succeeding day that all motor car manufacturers will not be able to make comparable progress in the resumption of passenger car production. War contracts obviously cannot be terminated or cut back on a flat percentage basis all along the line. Some plants may get 100 per cent cutbacks, others only 10 per cent. While this would appear to give some companies unfair advantage, the industry collectively does not quibble with this. The late starters soon can make up for lost time, and may experience far less difficulty with materials and parts than do the first companies to resume car production. All that is wanted is a reasonable unshackling from a multitude of governmental and bureaucratic controls and restraints, and the recognition that its engineering and purchasing experts know far more the mechanism of production than do government bureaus, however benign.

Studying the industry's reconversion timing chart, which at best is only an attempt to average conditions faced by the various units of the industry (STEEL, Jan. 1, p. 236), it becomes apparent not much progress has been made in three months on the six steps necessary to complete before victory in Europe, to assure minimum unemployment before the start of assembly operations.

Engineering and testing, reconditioning of tools and dies, ordering of materials, ordering of parts, and advance decisions on plant clearance and materials disposal are perhaps 50-75 per cent completed, but they were nearly at this stage at the turn of the year. The sixth factor—design, building and reconditioning of machine tools—is the stumbling block, far behind schedule,

MOBILE X-RAY UNIT: Four to five hundred people can be given chest x-rays daily by this mobile unit, built on a Reo chassis and delivered recently to the Ingham Sanatorium. The unit is designed to x-ray workers in industrial plants to aid in the control of tuberculosis

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HEAVY SLEDDING: Ten-ton steel sleds, for use by Army Engineers in Europe as portable beds for emergency power plants, are inspected by a worker at the Graham-Paige subsidiary in Warren, O. As the retreating Germans blow up their power stations, the engineers haul generating units into the area to supply current. These 22-foot welded skids are built to maintain precision alignment even when hauled over rough terrain

and by itself conceivably could hold up the entire reconversion picture. It is perhaps only 25 per cent accomplished. Prospects for any early correction of this deficiency are slim.

This suggests automobile production in its initial phases may be predominantly makeshift. Managements will resort to every expediency to maintain employment and keep reconversion on schedule, even if essential machine tools are lacking. This will not be easy. It may mean interchange of production facilities on a day-to-day basis which would be unthinkable in normal times. But it worked out successfully in the early stages of the war production program, and who can say the initial "peace emergency" will not be equally serious. Industry's co-operative achievements in wartime conceivably could work to mutual advantage in the immediate postwar period.

Army procurement agencies apparently are following automobile industry reconversion activity carefully. For example, a supplier here was contacted by an Army office last week and asked what percentage of his output for war requirements would be affected if a specified quantity of material were allocated to passenger car production. Why the Army did not consult the WPB for such information is a mystery, but perhaps reflects the constant lack of co-ordination between various agencies.

One of the latest rabbits to be pulled out of the inexhaustible union hat is the proposal advanced by Walter Reuther, director of the General Motors department of the UAW-CIO, that negotiations be opened with the corporation for the creation of a "social security fund" to be financed entirely by the corporation to the extent of 3 per cent of weekly wages of all workers. The money would not be deducted from wages, but would be an extra "contribution" paid into a social security fund administered by the union.

Two thirds of the fund would cover the cost of hospital, surgical and medical care, including 50 doctor calls either at home or in the office. After the first week of illness an employe would receive lost time compensation equal to 60 per cent of his weekly wage for the period of his illness, up to 52 weeks in any one year for any one illness or accident. The balance of the fund would be used to establish death benefits, out of which the beneficiary of any employe would receive $1500. Reserves in the death benefit fund would be used to build up UAW hospitals, rest homes and recreational centers for members. The plan would be supplemented by a continuation of family coverage policies now handled by nonprofit organizations such as the Blue Cross, this coverage to be paid by the worker through payroll deductions.

Thus the UAW-CIO now proposes to embark into the insurance business, along with its myriad activities such as the Political Action Committee, the Labor Book-a-Month Club, etc. On the face of it, the social security fund idea seems little short of ridiculous.

Differences of opinion between union and management over the rehiring of veterans are slowly coming to a head, with the union still sticking to its belief that a veteran shall not be credited with any seniority until he has been hired and completed a probationary period. This would of course prevent the replacement of any present war worker by a veteran who had no seniority other than the period of time he spent in the service. In a recent statement bearing on the problem, presented by union officials to Brig. Gen. Hines of the Veterans Administration, the following curious comment appears: "Under conditions of modern total war, all persons make contributions to and sacrifices for the war effort in a manner and under conditions determined largely for and not by them. To attempt to grade the population into layers of employment preference—rewarding some at the expense of others—is bound to result in widespread inequity, for there is no logical basis upon which to assess the relative value of the individual cogs of the war machine. Any attempt to establish orders of relative employment preference will prove unworkable in practice because private employers competing for profit must base their selections of individuals for employment on the qualifications of the applicant to perform the duties of the vacant job."

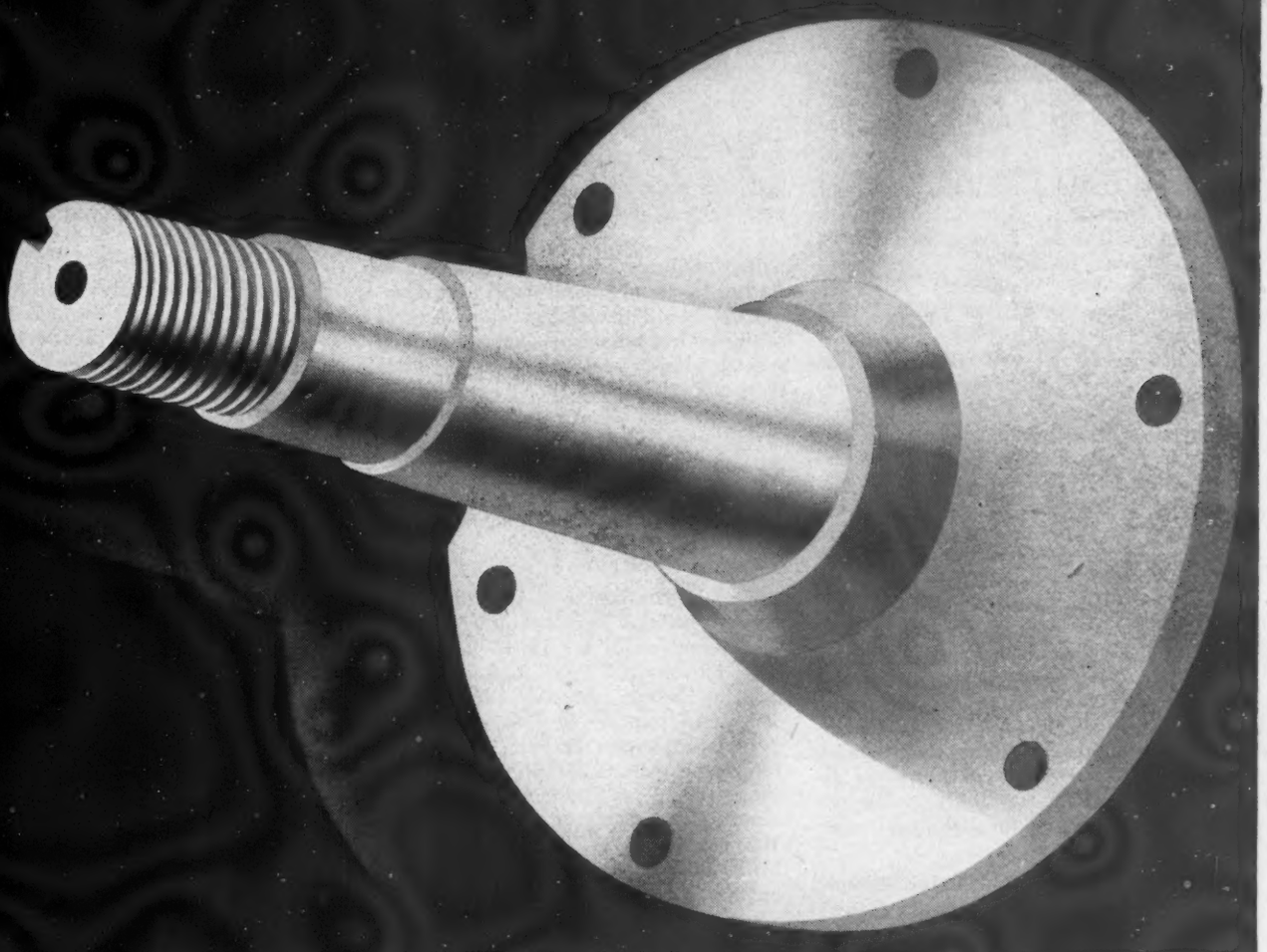
Seniority Reigns Supreme

If this is not an indictment of the union's own pet seniority system under which very definitely "the population is graded into layers of employment preference," then it is just some more double-talk. No one knows better than union leaders of the virtual impossibility in unionized plants today of selecting "individuals for employment on the qualifications of the applicant." Seniority reigns supreme, and its vicious aspects become more glaring as employment tapers and more veterans return looking for work.

General Motors' annual financial report showed 1944 deliveries of war products were up 3 per cent in dollar volume over 1943, 15 per cent in physical volume. Total volume of war shipments from the beginning of the Defense Program through 1944 by GM plants aggregates $10 billion. During the three years ended Dec. 31, 1943, the corporation provided by charges to income reserves for reconversion and plant rehabilitation slightly over 76 million dollars, about half of this amount in 1943 alone. No additional provisions were made in 1944 inasmuch as the amount now in this account appeared adequate.

Inventories at the end of 1944 were just under $500 million, a decrease of nearly $66 million for the year. Included were about $110 million of commercial products, a large proportion representing parts for cars now on the road.

Molybdenum is an economical preventive of temper brittleness in steel.



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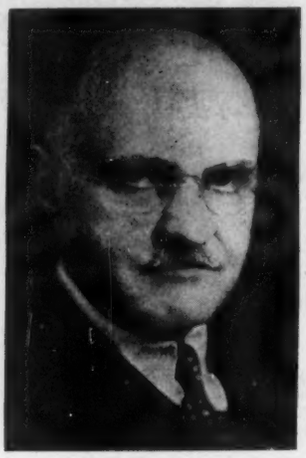

F. G. SCHRANZ

G. H. WOODARD

Robert G. Allen has been appointed general manager, Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia. In 1925 Mr. Allen became associated with Walworth Co., New York, holding the post of division sales manager from 1929 to 1936. From 1936 to 1940 he served two terms as representative from the 28th Pennsylvania district, in Congress. From 1940 to 1942, Mr. Allen served as president of Duff-Norton Mfg. Co., Pittsburgh, at the end of which time he was granted a commission as major in the Army, serving as chief of Tank Branch and later executive officer of Philadelphia Ordnance District. In 1943 he was promoted to rank of lieutenant colonel and transferred to field service overseas where he served as battalion commander and group commander. Mr. Allen replaces **Frederick G. Schranz** who resigned as vice president but who will continue in a consulting capacity. Mr. Schranz became associated with Southwark Foundry & Machine Co., which later became Baldwin Southwark Division in 1915.

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Carl A. Salmonsen has been named manager, Philadelphia works, General Electric Co., and **Robert Paxton,** former Philadelphia manager, has been appointed manager, Pittsfield, Mass., plant.

—o—

W. A. Elliott, vice president in charge of sales, Elliott Co., Jeannette, Pa., has been elected executive vice president. **Ronald B. Smith,** manager of engineering research and development, has been elected vice president in charge of engineering. **M. G. Shevchik,** secretary, has been elected secretary and treasurer. **F. W. Dohring,** general sales manager, will also serve as assistant to the executive vice president.

—o—

R. C. Campbell has been made head of European Division, Dorr Co., New York, to administer the company's European, African and Middle Eastern activities. Prior to the war, Mr. Campbell was assistant manager of the company's operations in Europe.

—o—

R. F. O'Brien has joined the technical staff of the Automatic Temperature Control Co. Inc., Philadelphia, where he will serve as instrument engineer, handling special sales and engineering applications.

—o—

Ira B. Joralemon has been elected a director of the Homestake Mining Co., San Francisco. He has been a consulting mining geologist and engineer since 1922.

—o—

N. K. Daerr has been appointed sales manager of the Fort Pitt Steel Casting Co., a division of the H. K. Porter Co. Inc., Pittsburgh. Prior to his appointment in 1940 as sales engineer in charge of eastern territory he was manager of the Manufacturing Division of the Fort Pitt company. Other appointments by the Fort Pitt company include **S. B. Nicholson** as associate sales manager, while **Harry J. Hatt, H. Ellwood Rankin,** and **M. K. Murray** have been appointed sales engineers.

—o—

D. J. Guggenheim, formerly resident comptroller, General Motors Corp. at Muncie, Ind., has been made assistant to the divisional comptroller, Chevrolet central office, Detroit. **K. W. Klesner** succeeds Mr. Guggenheim at Muncie. **R. L. Ahern** and **E. W. Daley** have been named Chevrolet resident comptrollers at Oakland, Calif., and St. Louis, respectively.

—o—

George J. Buerman has been appointed purchasing agent, Ferro Enamel Corp., Cleveland.

—o—

Three executive appointments have been announced by the Pittsburgh Steamship Co., Cleveland. Donald C. Potts has been named assistant to the president, while John E. Cottier has been promoted to the position of manager of traffic to succeed Mr. Potts, and David C. Stephens has been named to succeed Mr. Cottier as agent in Chicago.

—o—

George H. Woodard has been named manager of the newly-formed Aviation Gas Turbine Division, South Philadelphia works, Westinghouse Electric & Mfg. Co. Formerly manager of the company's New Products Division, East Pittsburgh, Mr. Woodard joined Westinghouse in 1936. Prior to that he had been development engineer with Ingersoll-Rand Co., Phillipsburg, N. J. **W. F. Boyle** has been named sales manager of the new division, **Reinout P. Kroon** has been named manager of the engineering department, and **Samuel S. Stine** has been appointed manager of manufacturing for the new division.

—o—

John F. Wallace, chief executive engineer, aircraft and automotive engineering department, Cleveland Pneumatic Tool Co., Cleveland, and **E. W. Cleveland,** special sales representative, have been elected members of the company's board of directors.

—o—

Charles Schramm, formerly manager of sales, Secondary Products Division, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed manager of sales, Tin Mill Products Corp., Pittsburgh.

—o—

George P. Sawyer, vice president, Cerro De Pasco Copper Co., New York, has been elected a director. Mr. Sawyer has been associated with the company for more than 30 years.

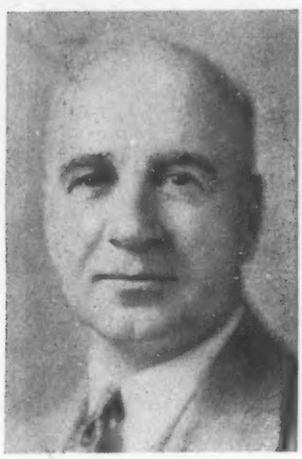
—o—

Sidney Grossman, Grossman Iron & Metal Co., St. Louis, has been appointed chairman, bundlers committee, Institute of Scrap Iron and Steel Inc., Washington.

—o—

T. B. Counselman has been appointed head of Contract Engineering Division, Dorr Co., New York, with headquarters there. Mr. Counselman has been man-

E. C. GYLLENSVARD



F. G. NUNNELEY

L. B. KEPLINGER

ager of the Industrial Division of the company's Chicago offices since 1928.

—o—

Eric C. Gyllensvard has been appointed export sales manager, Farrel Birmingham Co. Inc., Ansonia, Conn., with offices at 3700 Chrysler building, New York. After graduating from Cambridge University, Mr. Gyllensvard spent eight years with Standard Oil Co. in the service of its subsidiaries abroad. In 1937 he joined Sullivan Machinery Co., Michigan City, Ind., handling export operations for the last seven years. In 1942 and 1943 he was president, Machinery and Metals Export Association and also served on the Lend-Lease Foreign Trade Council. Mr. Gyllensvard is now a member of Foreign Economic Administration Committee and the Far Eastern Committee of the National Foreign Trade Council.

—o—

Rowland Burnstan, president, Lawrance Aeronautical Co., Linden, N. J., has been elected a director and president, Indian Motocycle Co., Springfield, Mass., of which he recently became general manager, succeeding **Dwight L. Moody,** with the company since 1917, in the latter position. **E. Paul duPont,** formerly president of Indian, is chairman of the board, a newly created office. **Walter A. Bowers,** Princeton, N. J., has been elected a director.

—o—

A. H. Keetch has been made head of the newly organized Sales-Service Department, the Warner & Swasey Co., Cleveland, after a two-years leave of absence on government service. In Washington he served as Chief of Priorities and Distribution Branch, Tools Division, War Production Board. Shortly after joining the company in 1917, he transferred to the sales department and for twenty years served as representative and as district manager at Buffalo.

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John Walker has been appointed manager, sales engineering department, Mack International Motor Truck Corp., New York. Mr. Walker has been with the company since 1918.

—o—

Fred G. Nunneley has become general manager, Powell Equipment Co. Ltd., Winnipeg, Canada. Mr. Nunneley had been Canadian sales manager, Caterpillar Tractor Co., Peoria, Ill., since 1935.

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Clem Stein, manager, industrial sales, International Derrick & Equipment Co., Columbus, O., has been elected president, American Hot Dip Galvanizers Association, Pittsburgh.

—o—

William deKrafft of New York, since 1938 financial advisor to Koppers Co., Pittsburgh, and affiliated companies, has been elected a director, Koppers Co. Inc., filling the vacancy created by the death of J. T. Tierney.

—o—

Arthur A. Pieper has been elected financial vice president, Republic Aviation Corp., Farmingdale, L. I.

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William I. Aitken of Lincoln, Neb., has been elected a director, Addressograph-Multigraph Corp., Cleveland.

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John J. Caldwell has been appointed insurance relations engineer, Walter Kidde Co., New York.

—o—

Charles A. Hird has been elected treasurer, Penn Metal Co. Inc., Boston, to succeed **J. G. Crowley.** For the past four years Mr. Hird has served in the Royal Canadian Air Force as flight lieutenant.

—o—

J. A. Rumpsa, formerly assistant purchasing agent, Caterpillar Tractor Co., Peoria, has become director of purchases, Young Radiator Co., Racine, Wis.

—o—

Joseph S. Sampson has been made assistant to general traffic manager, Wickwire Spencer Steel Co., New York. **Donald J. Carey** has been appointed to succeed Mr. Sampson as head of the company's New England Traffic Division, at the division's new headquarters, New Bond Street, Worcester 6, Mass.

—o—

Livingston B. Keplinger, vice president, Rheem Mfg. Co., New York, has been re-elected president, Steel Shipping Container Institute Inc., New York. Vice presidents elected were: **H. W. Lees,** vice president, J. & L. Steel Barrel Co., New York; **John Hauerwaas,** president, United States Steel Products Co., New York; **E. G. Gardner,** vice president, National Enameling & Stamping Co., Milwaukee; **C. M. Andrado,** secretary. **John** Neudoerfer, vice president, Wheeling Steel Corp., Wheeling, W. Va., and **H. P. Thelen,** manager of container sales, Continental Can Co. Inc., New York, were elected directors of the association.

—o—

Henry F. Millmann has been elected president, Geuder, Paeschke & Frey Co., Milwaukee, succeeding Frank A. Frey, who died recently. Mr. Millmann, who recently observed his 75th birthday, started with the firm as office boy 54 years ago. After learning factory production he went into the purchasing department, later becoming purchasing agent and, in 1932, director of purchases. He became vice president in 1935. Other officers elected were: **Captain A. K. Paeschke,** now with the Army, vice president; **F. T. Frey,** vice president and treasurer; and **A. J. Lehmkuhl,** secretary and assistant treasurer.

—o—

E. A. Gillies has been elected a vice president, Ryan Aeronautical Co., San Diego, Calif., succeeding **C. L. Woodson,** who has resigned to enter business for himself.

—o—

J. J. Roessle, formerly of Mesta Machine Co., Pittsburgh, has joined Hyatt Bearings Division, General Motors Corp., as sales engineer at Pittsburgh divisional sales office.

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J. R. Guth has been appointed director of purchases, Tyson Bearing Corp., Mas-

sillon, O. Before joining Tyson a year ago as assistant sales manager, Tyson Aircraft Division, Mr. Guth was with Goodyear Aircraft, Akron, O.

—o—

Robert B. Heppenstall, president, Heppenstall companies of Pittsburgh, Detroit, and Bridgeport, Conn., has been elected president of the Pennsylvania Chamber of Commerce.

—o—

E. R. Goodrich and **John E. Kenney** have been elected vice presidents of Foster Wheeler Corp., New York.

—o—

William F. Tuttle has been appointed assistant chief engineer, General Engineering Division, the American Rolling Mill Co., Middletown, O. Mr. Tuttle has been with the company since 1922. In 1930 he was named works engineer, and in December, 1944, was made assistant to the manager of the East Works.

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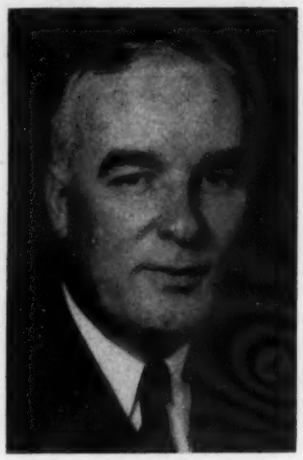
Dr. W. B. Pings has joined the staff of Arthur D. Little Inc., Cambridge, Mass. He previously was at the experimental station of E. I. du Pont de Nemours & Co., Wilmington, Del.

—o—

A. R. Marshall, veteran of World War I and II, has been made chief, industrial relations department, Stinson Division, Wayne, Mich., Consolidated Vultee Aircraft Corp., to succeed **R. G. McGuire,** retired. In 1942 Mr. Marshall left his position as wage and salary director at the company's Nashville Division to reenter the Navy. He served in the Pacific area until 1944 at which time he returned to the Nashville Division.



E. J. FLOOD

Who has been appointed general district sales manager, Chicago sales territory, American Chain & Cable Co. Inc., Bridgeport, Conn., as noted in STEEL, April 2, p. 92.

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Dr. Rupen Eksergian, consulting engineer, Edward G. Budd Mfg. Co., Philadelphia, has been awarded the Louis E. Levy Medal by Franklin Institute, Philadelphia. Dr. Eksergian, who is distinguished in fields of railway research on steam, diesel and lightweight trains, ordnance artillery design and development of generalized dynamic methods for machine analysis, received the Levy Medal for his paper entitled, "On the Reaction of Fluids and Fluid Jets."

—o—

Five new members from the metals industry who have been elected by the Controllers Institute of America are: **Royal G. Parks,** controller, National Malleable & Steel Castings Co., Cleveland; **Frank T. Humiston Jr.,** controller, Brush Beryllium Co., Cleveland; **Louis J. Bachand,** controller of Metals Disintegrating Co. Inc., Elizabeth, N. J.; **Donald E. Castle,** controller, Northwestern Steel & Wire Co., Sterling, Ill., and **Arthur J. Sowers,** treasurer, Spun Steel Corp., Canton, O.

—o—

Nathan R. Johnson, factory manager, has been elected a director of the Buffalo Forge Co., Buffalo.

—o—

Charles B. Parsons, first vice president, has been elevated to the presidency, American Hardware Corp., New Britain, Conn., succeeding **George B. Kimball** who becomes chairman of the board. **Isaac Black** has been elected first vice president. Mr. Kimball had been president of the company since 1925.

—o—

W. S. James, chief engineer for Studebaker Corp., Detroit, since 1936, and active with that company since 1926, has been named director of automotive research for the Ford Motor Co., Dearborn, Mich. Long prominent in automotive engineering circles, he was president of the Society of Automotive Engineers, New York, in 1944.

OBITUARIES . . .

George H. Wright, among the first to produce stainless steel and a contributor to many improvements in metals since he began working in 1902 at the Works Laboratory of General Electric Co., Schenectady, N. Y., died March 26. He was 62. Mr. Wright was recognized as an authority in the development of uses for new metals and for his contribution to the manufacture and adoption of high-speed cutting steels. He produced the material known as Calorite. During the past two decades he had concentrated on the improvement of high-temperature and high-strength materials for use in steam turbines.

—o—

Robert Munnell, former president, Waynesburg Pressed Steel Co., Waynesburg, Pa., died there March 25. He was 83 years old.

—o—

Leigh B. Lynch, 62, supervisor, industrial relations, Detroit Naval Ordnance Plant, died in Birmingham, Ala., March 25. Since coming to Detroit in 1909, Mr. Lynch had been with Studebaker Corp., Fisher Body and Hudson Motor Car Co. When Westinghouse Electric & Mfg. Co. succeeded Hudson Motor as operator of the Detroit Naval Ordnance Plant, Mr. Lynch continued with the new operations.

—o—

Robert J. Hamilton Jr., 53, president, Hamilton & Co., Ephrata, Pa., died March 30 at Lancaster, Pa.

—o—

Walter E. Stevens, 33, in charge of planning division of one of the plants of Grumman Aircraft Engineering Corp., Bethpage, L. I., died recently at Huntington, L. I.

—o—

Harry L. Chisholm, retired secretary, Atlas Steel Casting Co., Buffalo, died recently in that city.

—o—

Leland Russell Van Wert, 53, consulting metallurgist for Leeds & Northrup Co., Philadelphia, and former assistant professor, Carnegie Institute of Technology, Pittsburgh, died recently at Philadelphia. Mr. Van Wert joined Leeds & Northrup in 1937 and became chief of the metallurgical section in 1939. He was a member of American Association for Advancement of Science, American Institute of Mining and Metallurgical Engineers, American Society for Metals, Society for the Promotion of Engineering Education and the Franklin Institute of Philadelphia.

—o—

Herbert R. Allen, New York district manager, Square D. Co., died recently at Mt. Vernon, N. Y.

—o—

James E. Miller, 65, heating engineer, Bell & Gossett Co., Morton Grove, Ill., died March 25 at Evanston, Ill.

—o—

Clifford Fosdick Kern, 73, founder of the former Kern Machine Tool Co., Cincinnati, died there recently.

—o—

John E. Hall, 80, superintendent, American Steel & Wire Co.'s rod mill, Chicago, from 1919 to 1929 and associated with the company 37 years, died recently.

—o—

Lawrence John Orton, 48, production manager, South Bend Tool & Die Co., South Bend, Ind., died recently.

—o—

Walter Byron Smith, 66, chairman of the board of directors, Illinois Tool Works, Chicago and Elgin, Ill., died April 2 at his office in Chicago. Mr. Smith had been a director of the company since its beginning in 1915.

Postwar Utilization of Coast War Plants Presents Problem

Businessmen and civic leaders at San Francisco warned plans should be developed for adapting extra factory space to peacetime production. Action needed to hasten reconversion and avoid postwar unemployment

SAN FRANCISCO civic leaders and businessmen have been warned that plans should be developed for utilizing extra factory space and war plant facilities in order to hasten reconversion and avoid unemployment after the war ends.

The advice was given by Charles Flato, special assistant to the Surplus Property Board, in San Franciso to attend a Bay region management conference

"War facilities in this area", he said, "were designed to do special assignments and it will take ingenuity to keep them from becoming a drug on the market."

The area's great shipyards might devaluate to virtually nothing, Mr. Flato said, pointing out that factory space and shipyards are not as easy to sell on a peace market as jeeps and Army trucks. He recalled that after the last war the government experienced great difficulty in disposing of the Hog Island yards on the East Coast, and finally they were sold at only a fraction of the original cost.

"You have a great opportunity here, and also a great problem," he told the San Francisco businessmen. "The government cannot take the responsibility of maintaining the industrial yardstick in the community. Its only responsibility is getting rid of the property when it becomes surplus."

Wise Action Necessary

Mr. Flato, discussing the overall surplus property problem, said the government disposal agency must act wisely or economic panic might result for the nation.

"We have everything from ships to bedsheets," he said. "Salvage operations could be very disruptive to the nation's economy. We must make a market analysis of each commodity so we know where and how fast these should be distributed after the war."

Some disruption is unavoidable, he said, and stated that the board may decide to withhold some commodities or to sell them abroad in a non-competitive market.

Mr. Flato believes it is inevitable that a lot of surplus property will be scrapped. He disagrees with a recent congressional estimate that the board will have 100 billion dollars of surpluses to sell. He pointed out that such a figure is based on original values which will not be realized, and in addition a great deal of property never will reach the market. He also believes much of the equipment used by the Army overseas will not be returned to this country.

Many wartime engineering accomplishments will find peacetime applications, Marvin W. Smith, vice president, Westinghouse Electric & Mfg. Co., said in San Francisco recently. Among these is the steam turbine locomotive which can produce greater amounts of power with the same fuel consumption as ordinary steam locomotives.

Westinghouse now has under consideration the use of a modified tank-gun stabilizer to make trains and buses ride more smoothly, Mr. Smith said. Postwar householders may live in a more healthful atmosphere and will be able to reduce cleaning costs as a result of an electronic air-cleaner. The device is now used to purify air in factories.

Commercial aviation will derive great benefits from research developments which have increased the range of warplanes.

"A lightweight electric generator, designed by Westinghouse engineers, which produces more power per pound of weight than any previously built, will supply the many electrical demands of large aircraft with increased efficiency," he said. "Another device called the torquemeter, which enables pilots to determine the power output of engines with increased accuracy, promises a saving in fuel and an increase in payloads of postwar airplanes."

Mr. Smith is in charge of new engineering developments for Westinghouse.

Warns Pacific Northwest Must Work To Keep Industry

Cities in the Pacific Northwest must show increased interest if they are to retain present industrial plants, Thomas J. Bannan, president, Western Gear Works, Lynwood, Calif., asserted recently discussing the postwar outlook of the metalworking industry.

There are a number of natural disadvantages that have to be overcome by metalworking plants in the Pacific Northwest area, he pointed out. "Raw materials, freight rates, geography, public apathy, and labor attitude are a few. On the other hand, there are a few advantages, among them, climate, aluminum, and our proximity to the Orient.

During the war, the metalworking industry has done an outstanding job in the Pacific Northwest, he declared. After the war, no one can expect the industry to operate at the present volume, he pointed out. This, he stated, is particularly true on the West Coast because "It is not going to be a matter of reconversion as we have nothing to convert back to. It will be a new development and there probably will be a time lag in the West."

San Francisco Yards Given More Ship Repair Work

The Navy Department has assigned ship repair work to two additional yards in the San Francisco area, bringing to seven the number thus far scheduled for reconversion from shipbuilding to repair.

Latest contracts have been given Western Pipe & Steel Co. and General Engineering & Drydock Co. The other five yards which have been given repair work are Kaiser's Richmond No. 3, Bethlehem Steel Co., Hurley Marine Works, Moore Drydock Co. and United Engineering Co.

Northern California Gets $7 Million in New Plants

New plants established in northern California during February numbered 24, representing an investment of $7,139,700. In addition, expansions of 19 existing plants involved $1,472,000.

Among the February developments are: Shipyard docking basin in Monterey county; a $1,750,000 private industrial project to be financed through sale of industrial sites near a land-locked harbor; Pacific Tire & Rubber Co., Oakland, a $1 million addition to plant; a $1 million sardine and tuna cannery at Sausalito, Calif.; an expansion of plant for postwar period by Pelton Water Wheel Co. of San Francisco; and expansion of tractor equipment manufacturing facilities by Rimple Mfg. Co. of Santa Clara.

Screw Machine Activities Increase in Los Angeles

One hundred twenty-five Los Angeles firms have 937 screw machines, with 2147 spindles, a report issued by the industry department of the Los Angeles Chamber of Commerce indicates.

Up to 1938, screw machine activities in Los Angeles were unimportant compared with those in the East and Midwest, the report points out. From 1936 to 1939, there was a steady increase in demand for diecasting inserts, rubber goods, plumbing and radio parts, these products comprising the principal output. Since 1941, many parts for aircraft, tanks, ammunition, radio, radar, rockets and water craft have been produced in quantities.

WING TIPS

Continuing research and development in aircraft design after the war urged as common-sense insurance against being caught unprepared in future. Program essential if aircraft industry is to be permitted profitable postwar operations

CITING the need for continuing research and development in aircraft design after the war as common-sense insurance against ever again being caught unprepared in the face of impending war, J. Carlton Ward, president and general manager, Fairchild Engine & Airplane Corp., New York, in an address at Detroit before the Engineering Society of Detroit and Institute of Aeronautical Sciences urged engineers and engineering organizations to lend their active support, and make it articulate with the Congress, to a program along the following lines:

1. Activation of a postwar organization such as a National Research Committee (already favored by military agencies, but not generally approved by industry).

2. Separation of Army and Navy experimental aircraft appropriations from procurement appropriations, and the continuation of experimental funds after the war.

3. Confining work of military aircraft laboratories and the National Advisory Committee for Aeronautics to research of a fundamental nature, and to evaluation of products and specifications for products.

4. Provision of funds to aircraft industry for product development, as well as orders for sufficient production to develop a tooling approach and the basis for manufacturing technique. It is axiomatic that more man-hours are required to ready production facilities for a specific plane than are required to build the prototype and fly it successfully.

5. Supplying the Army and Navy with a sufficient quantity of newly developed airplanes so they can develop the strategy and tactics for their proper use in combat.

6. Programming of appropriate government research work for universities and other scientific groups so that in times of emergency they can be mobilized without delay or indoctrination.

7. Provision in postwar compulsory military training for the uninterrupted education of engineers, research workers and professional personnel, with the orientation of subsequent military training in channels best suited to the prior education of these men.

8. Evolution of a realistic plan for scrapping and modernizing of all classes of weapons on a yearly basis to provide the industrial background for national preparedness.

Mr. Ward predicated his suggestions on the solid ground that history has proved wars inevitable as long as human nature remains what it is. The U. S., for example, has had a major war in every generation since its founding. Granting this truth, it is evident the most costly war—in blood, time and money—is the one for which no preparation have been made; while the best war (assuming any war can be good) is the one which is never fought because of foresight in the direction of military preparedness.

As to the future of the aircraft manufacturing industry, Mr. Ward noted it is now producing at a rate of about 12 billion dollars output annually, excluding 8 billions of production of aircraft by other industries. The most optimistic postwar studies do not suggest expenditure of much more than 100 millions annually for personal-type planes, which continue to be in the sports category; plus an equal amount for new commercial transport equipment, the equivalent of perhaps 400 new airplanes. If the industry is to continue to exist, military procurement and military research and development, must supply the balance. If the latter activity should approach annual investment of, say 800 millions, an overall total of one billion dollars worth of business would be in sight for the aircraft manufacturing industry, or one-twelfth of the current rate of production and probably enough for survival of the principal producers. In this thinking, Mr. Ward closely parallels the outlook of other aviation leaders, who have gone on record as stating a postwar level of business around 10 per cent of the present volume might permit profitable operations.

Urges Private Design Research

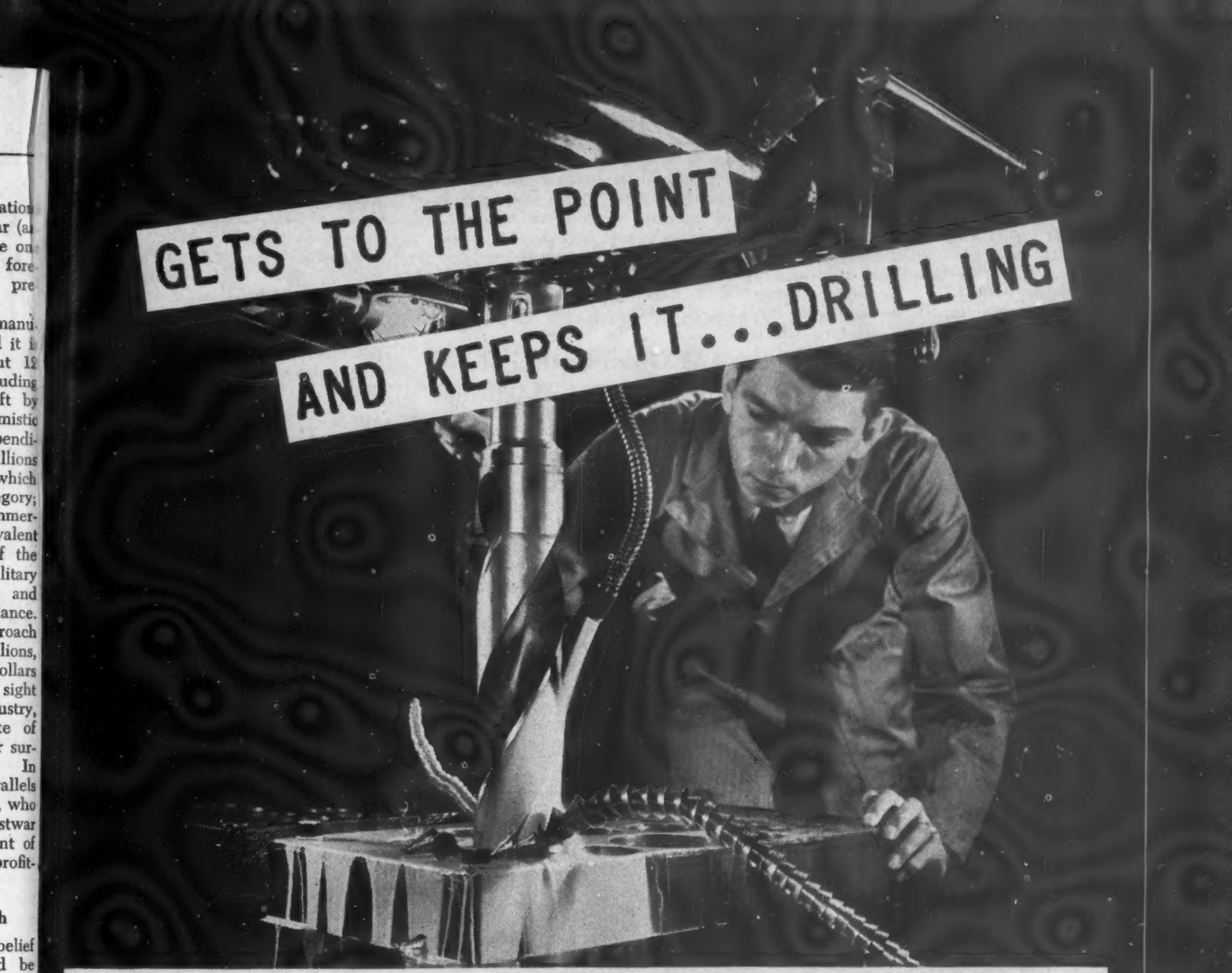
Mr. Ward was vehement in his belief design research on aircraft should be kept in the hands of private industry. He mentioned the case of the Naval aircraft factory in Philadelphia, established with government funds years ago and supposed to supply one out of every ten planes bought by the Navy, but which up to the present has not produced a single airplane or engine of its own design.

The question was brought up of how individual companies could survive a government design competition, if the eventual production orders were placed with only one company supplying the adjudged best design. Mr. Ward declared the costs of the "paper work" on new designs was usually moderate and could be repaid by the government. Manufacturers would not need to go beyond this point unless a specific number of actual airplanes was ordered; thus they would not stand to lose, since they would be repaid for their preliminary engineering work.

Putting the cards squarely on the table, Mr. Ward said, "Who can say that ten billion dollars in research and development could not have prevented this war—or at least made it much shorter? Considering the war costs us 90 billions a year, it is the kind of problem an engineer is peculiarly fitted to understand and deal with.

"The Germans are said to have spent

CONTROLLABLE WING: Tests are being conducted by Consolidated Vultee Aircraft Corp. of the Spratt controllable wing plane, shown in flight above. The invention of Dr. George Spratt, the controllable wing has been further developed by his son, George Spratt Jr., design specialist for Convair. No definite claims are made for the device by the company



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ten years in developing the V-1 robomb. Their military commanders have commented that had they had it one year earlier, England's course in the war might have been radically altered. War is made up of hair-trigger situations of similar portent. U. S. military forces and research experts had an aerial torpedo of the same general type which flew successfully in 1918 and 1919. Unfortunately, when our swords went into plowshares, we could not plow with it, so we dropped it, and are now reduced to belatedly making a faithful copy of the enemy's V-1 while he goes on to V-2.

"It has been said that in the field of theoretical supersonics (radar, etc.) we are one or two years behind the knowledge possessed by our principal enemy. The answer is plain. We did not turn our attention to such problems intensively until the war burst upon us. And now we have tremendous resources at work. But it is like putting ten inventors on one problem in order to speed invention over what one good man continuously at work can do. It is wasteful of manpower and duplication of expenditure without commensurate gain."

It is noteworthy to observe the same line of general thinking relative to preparedness in the design and development of military weapons on a continuing basis, expressed here by Mr. Ward, is echoed in comment made recently by other industry authorities, in particular, K. T. Keller, president of Chrysler Corp. (Steel, April 1, p. 89).

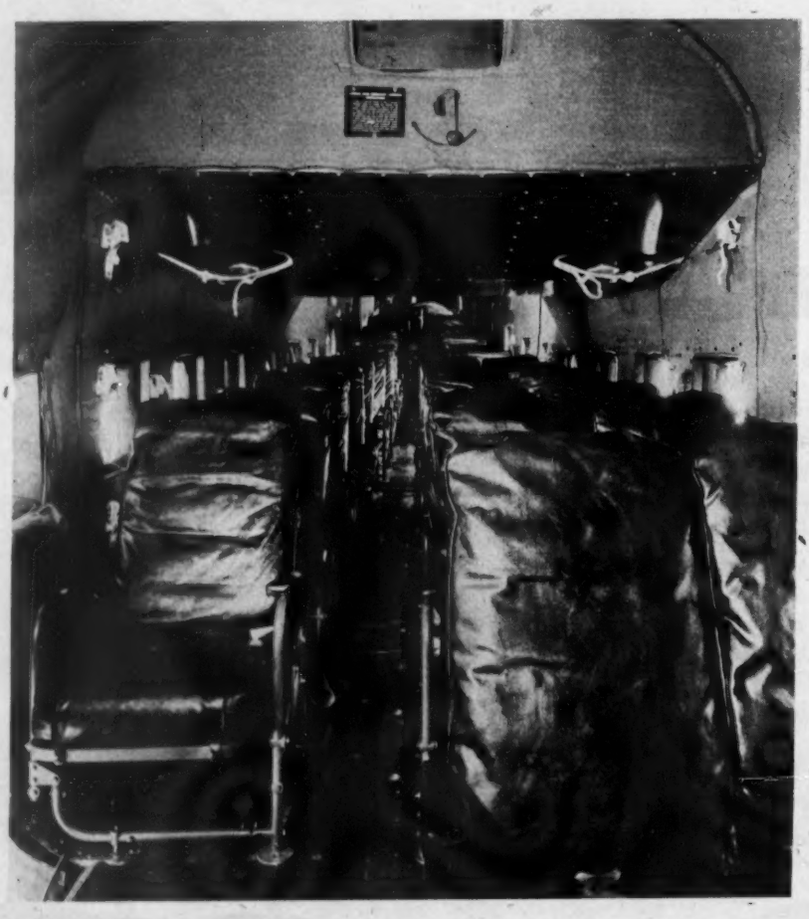
AAF Given Control of Part Of Signal Corps Activities

Transfer of all Signal Corps activities engaged in the procurement, inspection, storage, and issue of communications equipment used exclusively by the Army Air Forces was made on April 1 to the Army Air Forces.

Involving Signal Corps installations that handle AAF equipment in several parts of the country, the consolidation places more than 5500 civilians and 500 Signal Corps officers and enlisted personnel under the Air Technical Service Command, Wright Field, O.

Accountability for all materiel, equipment, supp'ies and leased equipment utilized by the Army Service Forces in respect to items peculiar to the AAF was transferred from ASF to AAF. Equipment involved in the transfer includes a wide variety of aircraft, radio devices, air tools, and ground apparatus.

Maj. Gen. Bennett E. Meyers, deputy director, ATSC, said "Placing the procurement and handling of aircraft communications equipment under the ATSC will speed up operations and improve the end product as a result of closer co-ordination between the engineering and procurement functions."



CONVERTED: This is an interior view of RY-3 transport, showing a conventional bomber converted to a transport type. Seats are provided for 28 passengers in the 4-engine plane

Firms To Integrate Postwar Manufacturing Programs

Rohr Aircraft Corp., Chula Vista, Calif., and International Detrola Corp., Detroit, have agreed on exchange of stock interests for integrated postwar manufacturing related to the aviation, radio and automobile parts industries.

Rohr Aircraft, with plants in Chula Vista and Fresno employing 6500, produces a variety of aircraft parts and subassemblies, and is also active in plane repairs and conversions. International Detrola has plants in Detroit, Elkhart, Ind., and Indianapolis, with approximately 2500 employes manufacturing marine propulsion units, airfield hoists, military tractor transmissions and other units. It operates a commercial welding division and also builds turret lathes at its Foster Division in Elkhart.

The two companies had aggregate sales in 1944 of $106,529,369. Fred H. Rohr is president of the West Coast company; C. Russell Feldmann is president of International Detrola.

Contract Provides Key Men For Indian Motocycle Co.

Lawrance Aeronautical Corp., Linden, N. J., has agreed to furnish to Indian Motocycle Co., Springfield, Mass., under contract, some of its key men, headed by Lawrance's president, Rowland Burnstan.

Simultaneously E. Paul DuPont, who has been president and a substantial stockholder of Indian, and the Indian Motocycle Co. proposed to grant to Lawrance an option on a block of Indian stock, representing control of that company. A stockholders' meeting to carry out the steps necessary to make the grant will be called soon. Recently, Mr. DuPont was elected chairman of the board of Indian, and Mr. Burnstan was elected president of Indian.

Ryan Aeronautical Co. Gets Additional Navy Contracts

Additional contracts totaling $45 million and calling for hundreds of Ryan fighting planes and almost doubling the number previously on order have been placed by the Navy with the Ryan Aeronautical Co., San Diego, Calif.

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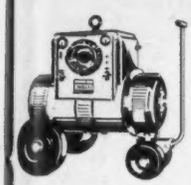

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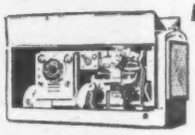
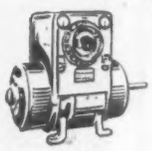
Most popular where electric power is not available and portability is essential. A "must" for all types of construction work such as bridge building, building construction, pipe line welding, shipbuilding, railroad welding and general maintenance.



Hobart Gas Engine Drive Stationary

Most popular where electric power is not available and portability isn't essential. Used extensively on long term construction jobs. Can also be used to form the nucleus of a mobile machine shop like those of the U. S. Army as noted in technical papers.



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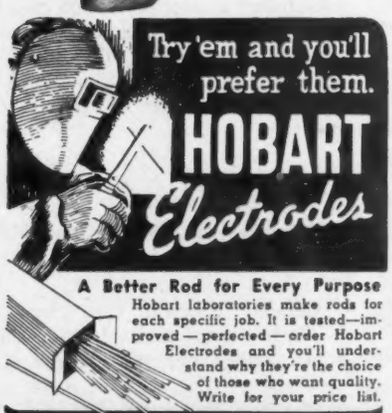

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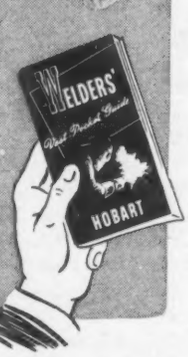

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British Iron and Steel Federation Reorganizing

Associations prepare for conditions expected in postwar period. Seek to avoid bureaucratic control

TO MEET conditions expected after the war, the British Iron & Steel Federation has adopted a new constitution. Delegates from every section of the British iron and steel industry met in London recently and voted overwhelmingly for adoption of the new constitution, one of whose guiding principles is self-government within the framework of government policy. The new constitution is designed to promote maximum efficiency in the industry, give full play to enterprise, and to avoid the stifling of initiative by dictation or bureaucratic control.

Development of the iron and steel industry in all its branches to the greatest possible extent, particularly for export, not only of its own products but also of other industries using its products is one of the aims under the revision. Full and regular employment and payment of reasonable and steady rewards to labor employed and to savings invested in the industry are sought.

The new constitution recognizes that the industry must have an organization which will insure that while it is united for common purposes, the management is sufficiently decentralized to give full play to enterprise and initiative.

Constant survey, planning, and investigation within the industry are also aims.

Limit Membership to Organizations

At present, membership of the federation consists partly of associations, regional representatives, and individual firms, but the new constitution provides that in the future full membership shall be confined to organizations (associations) set up by the various sections of the industry. Except as to general policy and national or common interest those organizations, or "conferences" as they are called in the new constitution, will be free to manage their own affairs.

The conferences in the particular form envisaged do not exist now. Time will be required for their formation, or for adaptation of existing associations.

The federation will be governed by a council and an executive committee, and each conference will be represented on the council in proportion to its relative importance. The executive committee will be chosen from members of the council, with the provision that each conference must be represented. Membership of the council and executive committee will be confined to persons directly responsible for management in their own companies.

Provision is made for any association in the United Kingdom, directly or indirectly concerned with the iron and steel industry, to become an affiliated member of the federation. Similarly, provision is made for affiliation of the iron and steel manufacturers in the dominions.

SAFETY GLASSES: Girl employe of the Kropp Forge Co., Chicago, receives free prescription test for safety glasses. Where prescription glasses are needed, the company will bear the cost

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Hamilton Helicopter Co. Inc., Baltimore, is equipping a building at 6005 Eastern avenue for manufacture of a patented variable blade propeller.

—o—

Reliance Machine & Tool Corp. has purchased a building at 10-12 East Van Cortland avenue, in the Bronx, New York, for use in processing war contracts.

—o—

Carl L. Norden Inc., developer and manufacturer of the Norden bombsight, has leased a building at 135-25 Northern boulevard, Flushing, Long Island, for an assembly plant.

—o—

Metal & Thermit Corp., New York, has appointed J. C. Miller Co., Grand Rapids, Mich., as a distributor of welding electrodes.

—o—

B. F. Goodrich Co., Akron, O., has established a sales promotion department to serve its replacement tire sales division in preparation of retail advertising and sales promotion material. A. R. Bowlzer is manager of the new department.

—o—

G. S. Ziegler & Co., New Market, N. J., manufacturer of pitch products, will increase its plant capacity 50 per cent by Aug. 1.

—o—

General Electric Co., Schenectady, N. Y., has developed a featherweight bazooka with a heavyweight punch and a new sight. The weapon is 42 per cent lighter than the standard model and may be handled as easily as a regular Army rifle.

—o—

Yoder Co., Cleveland, will be represented in Michigan by a direct factory branch, with offices in the Maccabees

building, Detroit. Manager will be E. C. Murdock.

—o—

American Car & Foundry Co.'s plant at Detroit had in 1944 a perfect safety record of no lost time accidents.

—o—

Geometric Stamping Co., Cleveland, has issued a booklet outlining a manufacturing service that includes all facilities for supplying precision stamped metal parts, welded subassemblies or complete products.

—o—

Pittsburgh Ordnance District, Pittsburgh, announced that a new fuse that can be attached to artillery shells can pierce concrete before the explosion occurs.

—o—

Old Dominion Iron & Steel Corp., newly chartered, has taken over the properties of the Old Dominion Iron & Steel Works Inc., on Belle Isle, Va., and will concentrate on manufacture of welded steel products.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announced that its employes' suggestions saved the war effort $1,765,059 in labor and material costs on armament production in 1944.

—o—

Herman Machine & Tool Co., Tallmadge, O., has been awarded a treasury certificate of merit for outstanding record of war bond sales.

—o—

Lempco Products Inc., Bedford, O., has been allocated $2,200,000 from Defense Plant Corp. to build and equip a manufacturing plant and forge plant in Byesville, O. The new facilities will be used in making shells.

—o—

Alexander Milburn Co., Baltimore, designer and manufacturer of gas cutting, welding, and spray gun apparatus, has been taken over by the newly-organized Black Mfg. Co., of which S. Duncan Black Jr. is president.

—o—

Ferro Enamel Corp., Cleveland, has published a color chart showing its oxides suitable in producing colored porcelain enameled ware.

—o—

W. G. Kerr Co., Pittsburgh, representing among others the Thomas Flexible Coupling Co., Warren, Pa.; Foote Bros. Gear & Machine Co., Chicago; and Reeves Pulley Co., Columbus, Ind., is now located in the Oliver building.

Milcor Co. Operations Transferred to Cleveland

The entire Milcor Steel Co. operation at Canton, O., has been moved to Cleveland where manufacturing and sales have been co-ordinated with those of the J. M. & L. A. Osborn Co., which recently was purchased by the Milcor company, Milwaukee, subsidiary of Inland Steel Co.

Revised name of the company is the J. M. & L. A. Osborn Co., Division of Milcor Steel Co. Other Osborn warehouses at Buffalo, Detroit, and Cincinnati will be in a position to handle Milcor materials.

George Climo and Clayton Caddy will remain as president and vice president, respectively, of the Osborn company. Other officers are: E. A. Tanner, chairman; G. W. Hillibish, vice president; E. L. Lipman, secretary-treasurer; and C. C. Bolus, assistant secretary-treasurer.

Don L. Rossiter, formerly district sales manager of Milcor at Canton, is now general manager of sales of the Osborn company. Joseph T. Hagan will remain at Cleveland as district sales manager of that territory. Carl T. Howe and A. E. Kirchgraber remain as district sales managers of the Osborn warehouses at Cincinnati and Buffalo, respectively. Carl F. Gruenert is the new district sales manager of the Osborn warehouse at Detroit.

AWARDS . . .

Award of the Army-Navy "E" has been made to the following:

American Steel & Wire Co., Duluth plant, Duluth, Minn.
Bishop & Babcock Mfg. Co., plants 1 and 2, Cleveland.
Chandler-Evans Corp., South Meriden plant, South Meriden, Conn.
E. T. Fraim Lock Co., Lancaster plant, Lancaster, Pa.
Moore & Kling, Boston.
North & Judd Mfg. Co., New Britain, Conn.
Ohio Crankshaft Inc., Cleveland.
Quincy Elevator Co., Tiffin, O.
Saginaw Body Mfg. Co., Saginaw plant, Saginaw, Mich.
Superior Coach Corp., Lima, O.
United States Rubber Co., Passaic plant, Passaic, N. J.
Artcraft Metal Products Co., Fall River, Mass.
Beaumont Electric Supply Co., Chicago.
Chicago Rivet & Machine Co., Bellwood, Ill.
O. Hommel Co., Carnegie, Pa.
Imperial Plating Co., Brooklyn, N. Y.
Midland Steel Products Co., Parish & Bingham Division, Cleveland.
Mississippi Valley Structural Steel Co., Melrose Park Division, Melrose Park plant, Melrose Park, Ill.
Peerless Chain Co., Winona, Minn.

Brisk Postwar Business Seen By Republic Steel

Company has virtually no problem of reconversion to prepare for peacetime, annual report points out

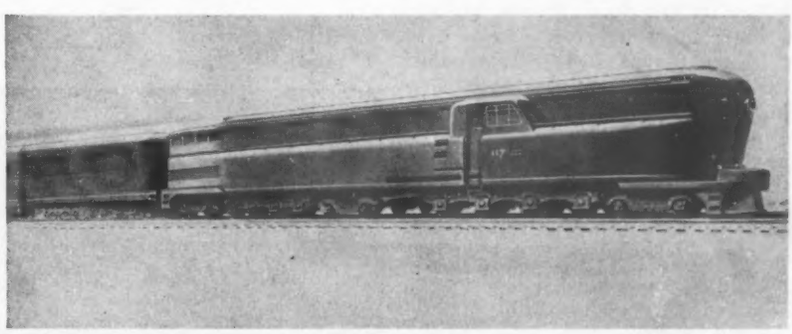
EXCELLENT postwar business should be enjoyed by Republic Steel Corp., Cleveland, judged on the basis of prewar standards, and substantial reconversion will involve only three of the company's plants, the firm's annual report to stockholders declares.

The report, signed by T. M. Girdler, board chairman, and R. J. Wysor, president, pointed out that the automotive industry, Republic's largest peacetime customer, will enter the peace with the largest backlog of unfilled demand in its history. Not only will there be a heavy demand for all kinds of durable consumer goods, but a huge highway construction program and a residential building boom will require considerable quantities of steel, the report asserted.

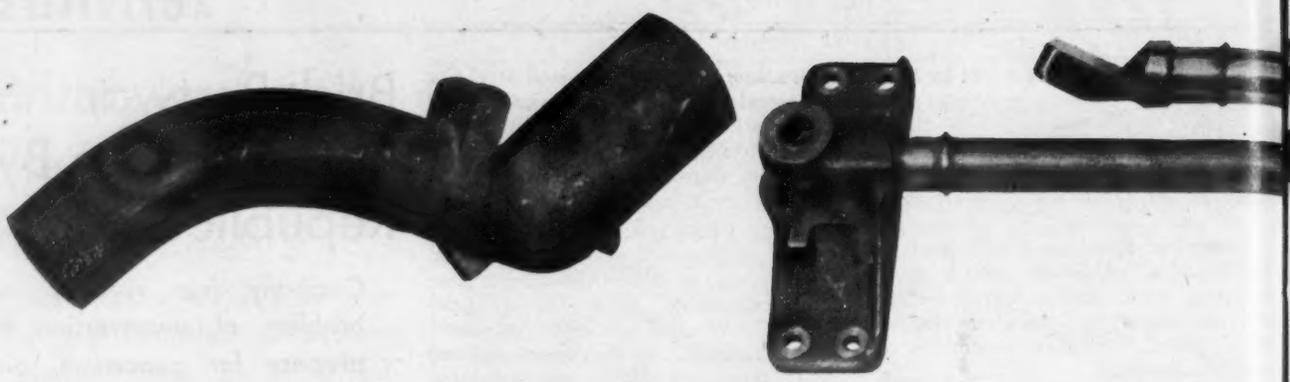
In Republic's steel plants and in many of its manufacturing divisions there is virtually no reconversion problem. However, considerable reconversion will take place at the Youngstown, O., plant of the Truscon Steel Co., at the Berger Mfg. Co. division plant No. 2 at Canton, O., and at the Truscon plant at Cleveland.

Building Projects Planned By Minnesota Mining Co.

Minnesota Mining & Mfg. Co. is planning to enlarge its "Scotch" tape plant at St. Paul and to build a color-quartz roofing granules plant in the South.



TURBO-ELECTRIC: This locomotive, one of three ordered by the Chesapeake & Ohio, embodies the best features of steam, turbine and electric drive. It is capable of 100 miles an hour, and is built by Baldwin Locomotive Works and Westinghouse Electric & Mfg. Co.



FLASH WELDING SAE-4130S

By W. W. ACKERMAN*
Welding Engineer
And
WALTER PESTRAK
Senior Welding Engineer
Federal Machine & Welder Co.
Warren, O.

WHEN stresses in welded aircraft joints reached a point where the ordinary plain carbon steels failed to meet the necessary requirements, SAE-4130 was developed. SAE-4130 and its sister steels SAE-X-4130 and NE-8630 have distinguishing characteristics which make it particularly desirable as an aircraft steel. These characteristics include excellent strength-weight ratio, outstanding weldability, high tensile strength with good impact resistance.

While of outstanding weldability, however, it is only in recent years that the aircraft industry has flash welded this material. The advantages of the flash welded joint over the fusion welded joint are:

—Better physical characteristics (100% joint strength)

—Lower weights

—Cheaper and faster production with less operator skill

—No warping as a result of welding

—Less brittleness at low temperature such as are encountered at high altitudes

—Higher fatigue strength

Welded assemblies made from 4130 may be used without subsequent heat treatment. However, all types of welding have effects on this steel which make heat treatment advisable wherever it is practical. One reason is to release locked-in stresses caused by the contraction of the metal upon cooling.

Another is that just adjacent to the weld zone, a portion of the metal has been treated to just slightly below the critical temperature, thus causing an annealing effect. This may result in a 10 per cent drop in tensile strength.

The third or most important, however, is, that since chrome-moly is an air hardening steel, the fast cooling of the weld results in a brittle zone next to the weld. This is particularly true in flash welding where the chilling effect of the dies is tremendous. With proper die spacing and correct machine setting, all of these can be minimized to the point where subsequent heat treatment is unnecessary.

Lockheed Aircraft Co. reports that excellent physical test results have been obtained with welded joints in which the component parts have been heat treated up to 140,000 p.s.i., before welding with no heat treatment after welding. Of course, if there is to be no further heat treatment after welding, the steel must be in the normalized state before welding.

Type of Applications: To the present time, the majority of applications are on tubular sections. Typical parts include an end fitting to a tube joint in which the fitting may be either forged or turned down from solid stock, or one tube to another. The ranges welded may vary from less than 0.04 up to over 6 square inches.

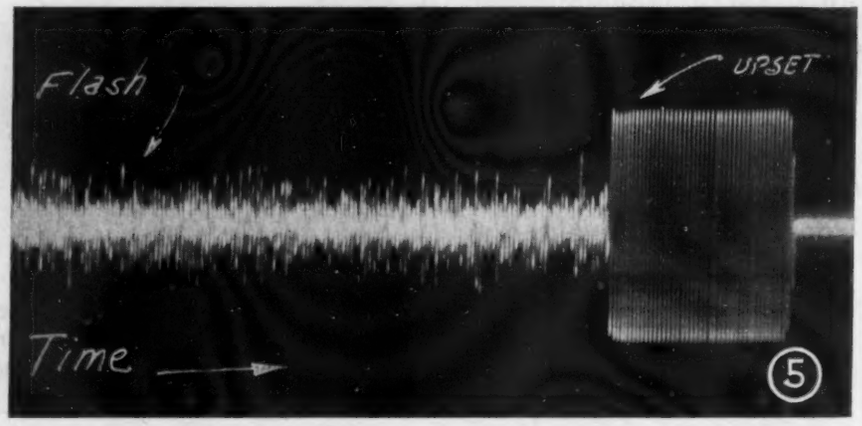
Design Consideration: One of the greatest hindrances to flash welding is the failure of the various industries to design their parts for flash welding. The net result is that critical welds are obtained from the standpoint of complete fusion and of weld brittleness, along with bad alignment.

The proper design of a part to be flash welded should be one in which there is sufficient clamping surface and length for die spacing with a definite machined backup. The main objection of the aircraft industry to the changing of the design is that since the tubular section of the forging must be lengthened this necessitates additional machining and a change of forging dies.

If the final use of parts is to be in the normalized state or at comparatively low heat treatment, all component parts may be final machined before welding and the final assembly be within customary tolerances of plus or minus 0.010 degrees. This is, of course, with an excellent flash welding design on the part. While these close tolerances can be held, it should be evident that they require more time for setup in the shop and require more skill from the operator. Consequently the design should not call for a tolerance which does not have to be held. For example, any part which has threaded fittings at one or both ends.

Welding Setup: Amount of burnoff and upset are functions of the wall thickness of the tubing and should be figured on that rather than on diameter or area. The following table gives the approximate burnoff and upset for various tubing wall thicknesses:

Wall Thickness	0.035	0.049	0.065	0.083
	0.125	0.156	0.250	
Total Flash	0.190	0.290	0.345	0.395
	0.430	0.485	0.532	
Total Upset	0.050	0.075	0.100	0.115
	0.135	0.140	0.188	



*(Since preparation of this article, Mr. Ackerman has died in the service of his country. —Ed.)

Fig. 1—Left, hydraulic landing gear assembly—X-4130 steel; center, above, wing strut assembly and bomb bay door bracket. All involve welding tubing to a forging

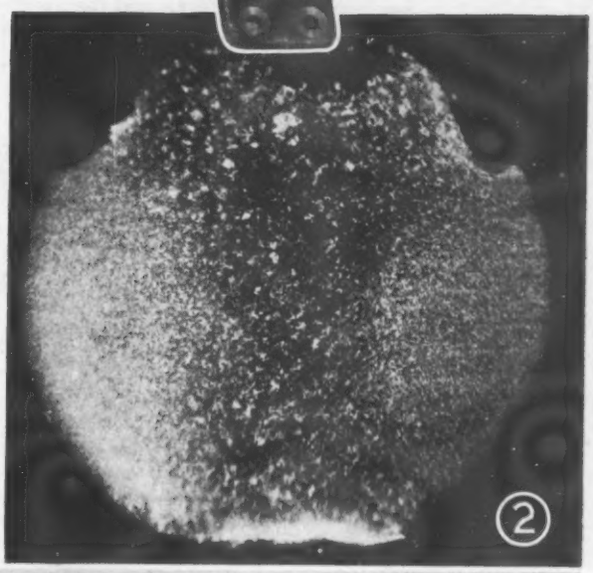


Fig. 2—Macrophotograph showing an X-4130 flash weld

STEEL

the present time and should be satisfactory for almost all applications.

In motor driven flash welders, the amount of upset is easily adjusted by shimming the upset block on the cam. However, there is some question whether with hydraulic machines the cylinder should be bottomed at the end of upset or whether the resistance of the metal to further upset should be the determining factor. The great argument for bottoming the cylinder is, of course, that it gives a definite take up.

It would seem logical, however, to believe that the best and most consistent welds can be obtained if exactly the same forging pressure is applied to the weld every time. Theoretically both methods should not only give consistent welds, but also definite take up. This is going on the assumption that the composition of the steel does not vary, that

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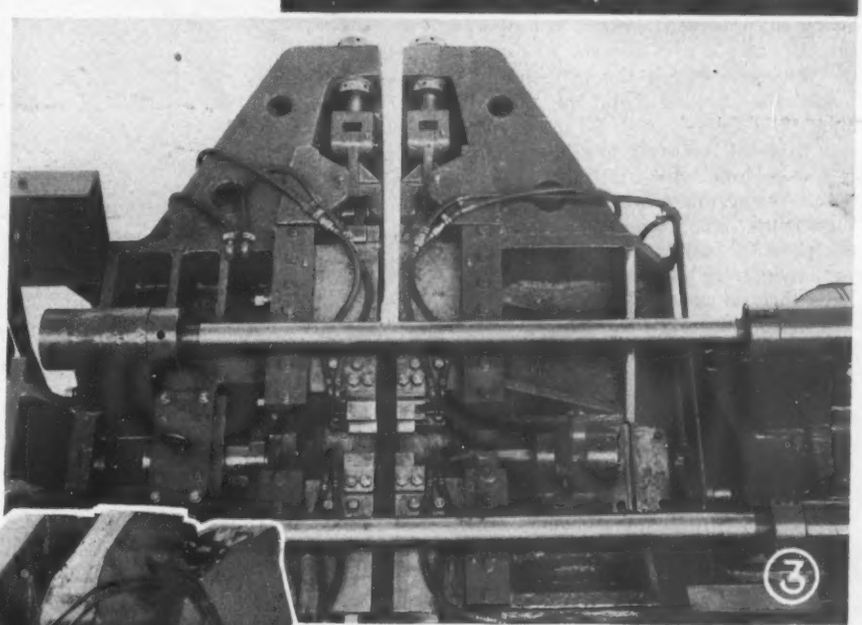


Fig. 3—Closeup of same welder as shown in Fig. 4, revealing the dies and the massively designed backing supports

Fig. 4—Heavy duty Federal flash welding machine for joining X-4130 chromium-molybdenum parts and those of similar alloys

Fig. 5—Oscillogram of current during making of a flash weld in X-4130 steel

The accompanying article has been prepared from a detailed report by Dr. R. S. Dean, assistant director, United States Bureau of Mines, Washington, covering the bureau's studies to date on improved utilization of domestic iron, manganese and chrome ores.

The Congressional appropriation authorizing investigation of raw material resources for steel production, Frank W. Boykin (Alabama), chairman, permitted the setting up of pilot-plant work in three areas to demonstrate what could be done by such an approach. The areas selected are the Central Valley area in California, Southeast Missouri area and the Southeastern area, centering in North Carolina. These areas were chosen because of a diversity of raw materials and the availability of power, natural gas, coal and other facilities. Dr. Dean has been working closely with the Boykin committee.

Sponge Iron

A PROGRESS REPORT

ALTHOUGH the work of Bessemer and Siemens provided simple and effective means for converting pig iron into steel and established the "blast furnace route" as the almost universal method of producing steel, metallurgists have not ceased to dream of direct steel. By direct steel is meant any process by which iron oxide in ore is reduced to iron of the same or greater purity than the final steel or wrought iron.

In general, direct-steel processes are "sponge-iron" processes, because reducing iron oxide without simultaneously alloying the iron with carbon, phosphorus, sulphur, and silicon present in ore and fuel succeeds only if the temperature is below the melting point of the iron. Such solid iron formed by reduction of iron oxide at relatively low temperatures is sponge iron, which is bulky and porous. When the reduction proceeds at the slightly higher temperatures at which the particles of metal can weld together or finally even melt to yield pellets or balls that do not have the porosity and low-density characteristic of sponge iron, the product might preferably be called simply "direct iron."

Thus, in general, direct iron may be obtained: (a) By rigorously purifying the ore before gaseous or solid-fuel reduction to sponge iron; (b) by first reducing the ore or concentrate and then purifying the resultant sponge iron magnetically or otherwise; (c) by metallizing under such conditions that the impurities of the ore or concentrate are slagged off.

I. Purification of Ore Before Reduction. The simplest method of removing impurities in any direct iron or steel process would be to remove them from the ore to start with. However, a survey indicated that, except in rare instances, this can be done mechanically to a high degree only with magnetite ore. There is a conviction that the great majority of hematite and limonite ores are not adapted for reduction to sponge iron by any process that depends on rigorous purification of the ore before metallization.

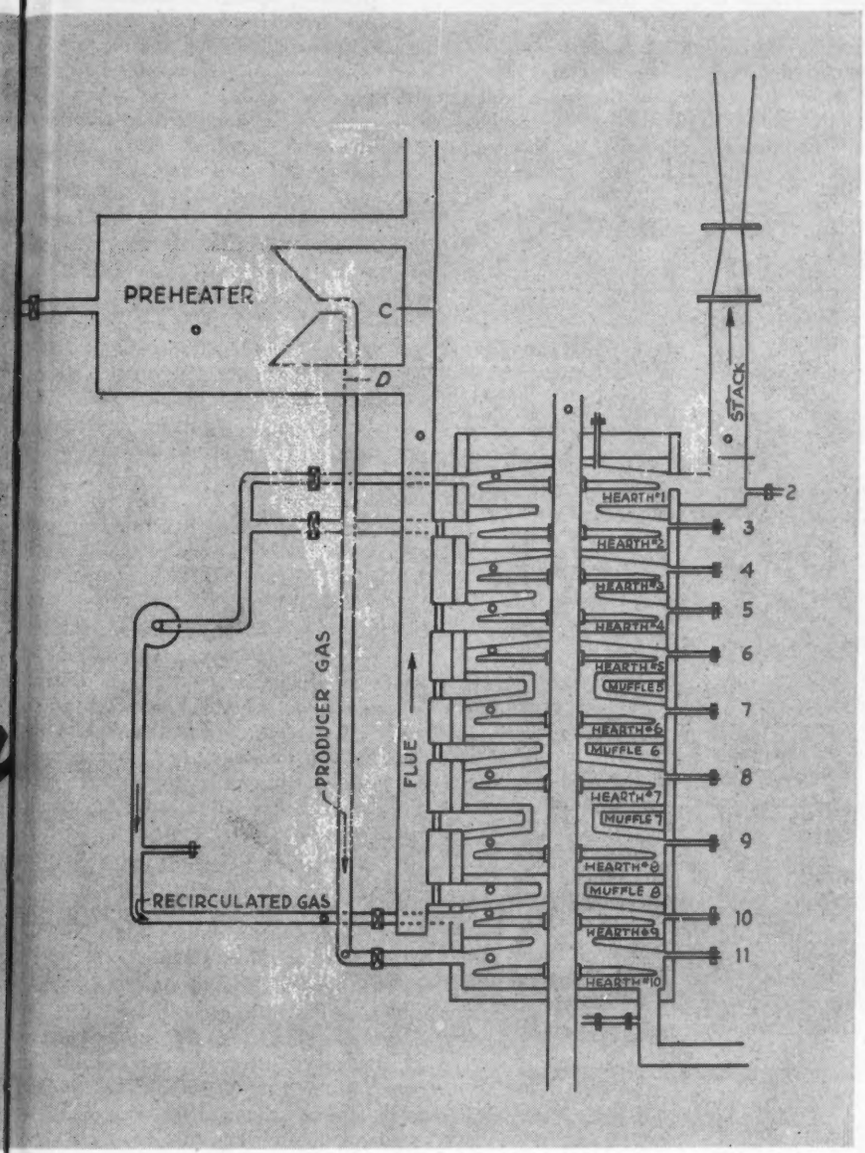
On the other hand, it is well-known that Eastern magnetites can be readily beneficiated to a high degree by magnetic means. To get the highest degree of concentration of a magnetite usually requires fine grinding. Such finely divided iron oxide may be metallized by gaseous reduction in two ways:

1. Suspending the ore in pure, hot gas.
2. Agglomerating the ore so that it will form a gas-permeable, self-supporting mass, and pass purified gas through the heated mass.

The first procedure has been demonstrated experimentally by the Brassert bubble-cap process, in which finely divided ores are fluidized in heated hydrogen. By the use of hydrogen, the reduction takes place at lower temperature, and any difficulty from carbon deposition that might take place with water gas is avoided. Reductions of well over 99 per cent can be readily obtained in this way.

The second procedure is based on work done nearly 10 years ago under Dr. Dean's direction (U. S. Patent 2,131,006) It was found that iron ore could be rolled up into glomerules by adding just the right amount of water and that these glomerules were strong enough to withstand heating until they became welded into strong, porous, unusually dense masses, highly suitable for reduction by gases. The density of these masses is indicated by the fact that reduced glomerules have a density greater than that obtained by briquetting the powdered iron under 25,000 p.s.i. pressure. Similar masses can be obtained by vacuum pugging and extrusion to form "bricks," which when heated to fairly high temperatures become strong and porous.

Such porous masses permit reduction to be carried out in a wide variety of equipment, including shaft furnaces, rotary kilns, and brick kilns. In using a shaft furnace, water gas may be employed if the glomerules are preheated and not in contact with the gas below 600 degrees Cent. to prevent formation of carbon. The glomerules may be passed through a rotary kiln with solid fuel, such as limed coke[2], which will not introduce sulphur. In such instances the reduced glomerules may be separated



Skinner multiple-hearth furnace

from the reducing agent residue by screening and, in actual test, showing a loss of the original sulphur in the ore rather than a pickup. If no sulphur has been removed, the reducing glomerules would have contained 0.047 per cent sulphur. The density after reducing was 2.85.

In brick-kiln reduction, the glomerules ur bricks may be loaded and surrounded with a limestone-coal mixture which, on heating, furnishes the purified gas for their reduction.

Any of the various means of carrying out the two basic methods of bringing iron ore and reducing gas into contact will produce a sponge iron in which substantially all the sulphur will be removed and the remainder of the impurities will remain in the iron. Examination of analyses of magnetic concentrates indicates that these impurities will be mostly silica or silica and alumina. The finished iron will then contain from 0.5 to 2.0 per cent silica and alumina; the remainder will be iron or iron and ferrous oxide, depending on the degree of reduction. It is not difficult to secure more than 99 per cent reduction.

This sponge iron, as a constituent of a steel melt, is equivalent to a good grade of acid open-hearth scrap containing perhaps 0.25 per cent silica. It would be lower in carbon, a factor rarely taken into account in steelmaking. The residual metals will, in general, be lower than in scrap. In most instances, the sponge iron would be lower in sulphur. The phosphorus content would depend upon the ore selected.

These factors would give the sponge iron made in this way a certain advantage over scrap in the manufacture of high-grade steels, where rigorous control of minor elements is of great importance. It would also be advantageous for making low-carbon material, such as silicon-steel transformer sheet.

II. Reduction with Subsequent Purification of Sponge Iron. The idea of solid reduction followed by separation of the nonmetallic impurities was first disclosed by J. T. Jones in U. S. Patent 891,705, June 23, 1908. Jones obtained the basic claim: "The method of treating iron ore which consists in subjecting a mass thereof under deoxidizing conditions to a temperature that will reduce iron oxides to metal without melting the iron or clay-forming constituents, in crushing the mass to pulverize the earthy constituents, and then in separating the iron from the earthy particles." Magnetic separation is disclosed but not claimed. Jones seems also to have had in mind further treatment of his sponge iron by briquetting and heating to a dripping temperature to squeeze out the remaining impurities as a slag, as is done in making wrought iron.

The Bureau's work with the Jones-type procedure includes:

Purification by squeezing.

Granular sponge iron made in the Bureau of Mines two-diameter rotary kiln.

Granular sponge iron made in the multiple-hearth furnace.

Reduction by means of natural gas.

1. Purification by Squeezing. Even with the most rigorous concentration of the ore, the silica content of the iron will be around 2 per cent in most cases. Removal of this silica, without combination with the iron, is desirable in many cases. This can be accomplished to a considerable extent by briquetting and heating to a dripping temperature and squeezing out as much of the slag as possible.

The squeezing procedure lowers the sulphur, phosphorus, and silica contents and thus marks sponge iron as a potentially advantageous raw material for wrought iron manufacture in which squeezing is already an essential step. For steelmaking, too, squeezed sponge iron would be an excellent raw material, if only it could compete in price with the corresponding grade of scrap.

2. Granular Sponge Iron Made in Two-Diameter Kiln: Granular sponge iron as originally made in the Bureau of Mines two-diameter rotary kiln[3] contained too much sulphur to be of use for steelmaking. Besides the squeezing process described, the sulphur content of rotary-kiln sponge iron can be decreased also by other methods, as heating to 800 to 900 degrees Cent. with a mixture of lime and reducing carbon.

This method of desulphurization is essentially the one that leads to the low-sulphur content (from 0.005-0.020 per cent S) of disk-type Swedish sponge iron, which is made in saggers by mixing 10 to 20 percent limestone with the reducing carbon. The process is described in a patent[4] which cites lowering the sulphur content from 0.3 to 0.03 per cent in 1 hour.

Any desulphurizing scheme, however, which involves a supplementary treatment after manufacture cannot be regarded as a satisfactory solution for the

problem of making a low sulphur sponge iron by use of the comparatively high-sulphur reducing agents and fuels that are commercially available. One of the significant advances made in sponge-iron manufacturing during the war is the discovery, referred to previously[5] that lime coke (or in the case of noncoking coals, limed char) as reducing agent in the rotary kiln yields a sponge iron containing less than 0.05 per cent sulphur instead of the 0.10 to 0.50 per cent sulphur obtained with unlimited reducing carbon.

The special field of application for this manner of operating the Bureau of Mines two-diameter rotary kiln is in the metallization of iron ores whose iron and silica contents are not too far beyond the limits prescribed for commercial ores, say 40 to 50 per cent iron and 6 to 12 per cent silica. Such an ore crushed to about −8 mesh and mixed, unconcentrated, with limed coke or char, when fed continuously to the rotary kiln, issues from the kiln 80 to 95 per cent reduced and yields, after passing over the magnetic separator, a sponge iron of 75 to 90 per cent metallic iron and 3 to 5 per cent silica.

The following analyses illustrate two extremes in the production of granular sponge iron by the Bureau of Mines two-diameter rotary kiln:

Analyses of granular sponge iron, per cent

	(1)	(2)
Total iron	78.0	91.26
Metallic iron	72.0	74.75
Reduction	92.0	82.0
Sulphur	0.065	0.047
Phosphorus	0.04	0.009
Carbon	0.03	0.372
Silica	10.0	1.22
Alumina	2.5	0.47
Lime	1.5	1.61
Magnesia	...	Trace
Titanium	...	0.29

The granular sponge iron represented by analysis (1) was made from Sunrise (Wyo.) ore and Wyoming sub-bituminous coal. The ore analyzes 47.3 to 55.9 per cent iron and 24 per cent "insoluble", of which about half is silica. Although the reduction to iron was 92 per cent complete, the subsequent treatment of the resulting sponge iron failed to remove enough silica to give a product with less than 5 per cent as specified and shows that not all ores within the limits given for the special application of the rotary-kiln method are amenable to the procedure of reduction followed by magnetic purification. When the silica or other nonmetallic impurities are intimately associated, as in the Sunrise ore, fine grinding frequently succeeds in unlocking these "insolubles," and they then may be removed by some form of concentration. The resulting concentrate, however, is more difficultly reducible and usually requires agglomeration, say as glomerules, before being subjected to metallization by any but the bubble-cap fluidization method.

An example of rigorous concentration before reduction followed by purification from the residues of the limed carbon reducer is given by analysis (2). The granular sponge iron was made from Scrub Oak magnetite concentrate bought on the open market and analyzing 68.8 per cent total iron and 5.5 per cent silica. This was reconcentrated on a magnetic separator to remove all but 0.6 per cent silica. The superconcentrate then was treated in the rotary kiln as usual and the product finally cleaned again by magnetic separation. Obviously, with preliminary beneficiation of the feed, the rotary kiln is capable of making a sponge iron that bears comparison with the high-grade products cited above for the glomerule and disk-type Swedish sagger methods. This assumes that the low degree of reduction (82 per cent) shown by analysis (2) is accidental and can be raised to 90 per cent or more by minor changes in operation. The high percentage of unreduced iron oxide and the low percentage of silica present in the particular lot of material represented by analysis (2) is, however, of a composition peculiarly suited for the briquetting and squeezing process.

3. Granular Sponge Iron Made in the Multiple-Hearth Furnace: The multiple-hearth furnace has been most generally used on exothermic reactions, where the atmosphere is oxidizing. To use this type of equipment for endothermic reactions, heat must be supplied. This may be accomplished to some extent by preheating the ore and the gas. It may also be accomplished by using a muffled hearth furnace, in which the furnace hearths on which the reaction takes place, are indirectly heated.

The muffled-hearth furnace of the Skinner type has been successfully used for calcining calcium carbonate and regenerating CO_2. In this case, however, the atmosphere is oxidizing, and gas is generated in the muffled hearths, which tends to prevent leakage of the combustion gas into them. When the operation to be carried on is a reducing one, the problem of heat-resisting alloys and leakage into the muffled hearths becomes greater.

The Bureau of Mines has carried on the reduction of manganese dioxide to MnO in a Skinner multiple-hearth furnace and has obtained satisfactory results.[6] Therefore, it was decided to determine whether or not this furnace could be used satisfactorily for sponge iron production where the reducing conditions must be much greater and where the reaction is decidedly endothermic, as compared to the almost adiabatic reaction for reducing MnO_2 to MnO. The furnace arrangement is shown in the accompanying illustration.

The low capacity of the furnace and the poor gas utilization showed that the Skinner furnace, arranged as for reduction of manganese ore, was not suitable for sponge-iron manufacture. The transfer of heat from the muffles was evidently inadequate and the mixing of the ore with the gas was also inadequate. To obviate these difficulties, changes are being made in the rabbling and method of gas introduction and preheating, and further tests will be conducted.

4. Reduction by Means of Natural Gas. Reduction of iron ores by converted natural gas was studied by the Bureau of Mines some years before the war.[7] In this process, the ore was passed through a rotary kiln and reduced by a hot mixture of hydrogen and carbon monoxide produced by the catalytic combustion of methane.

Madaras adopted the same principle of natural-gas conversion but substituted simple, upright batch-reducing chambers in which channeling of the ore column was prevented by introducing the gas in surges under pressure.

In 1943 the Bureau of Mines made some tests of the process, using a pilot plant built by the Madaras Steel Corp., Longview, Tex. The ore chosen for the tests was from the North Basin area near Linden, Cass County, Tex. An

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TEST DATA ON MELTING OF SPONGE IRON IN ELECTRIC FURNACE

	Heat 1	Heat 2	Heat 3
Total power used, kw. hr.	1320	910	1070
Power per ton of charge, kw. hr.	927.3	880.2	985.9
Power per ton of metal, kw. hr.	1727.7	1273.6	1493.4
Time of heat, hrs.	2½	1½	2-1/6
Furnace charge:			
Scrap, lbs.	582	...	...
Sponge iron, lbs.	2000	2000	2000
Coke, lbs.	100	...	...
Iron oxide, lbs.	35	25	95
Sand, lbs.	75	...	20
Limestone, lbs.	10	...	...
Ferromanganese, lbs.	14	12	25
Pouring temperature, °F.	3100	3000	2930
Yield of metal, lbs.	1528	1429	1433
Metal recovered, based on total iron in sponge and scrap, %	73.8	96.0	96.3
Analysis of metal:			
Carbon, %	1.35	0.79	0.34
Manganese, %	0.77	0.59	0.98
Phosphorus, %	0.119	0.156	0.159
Sulphur, %	0.052	0.018	0.027
Silicon, %	1.15	0.75	0.68

Seven-Roll Round Straightener

- Has unusual combination of rolls
- Trues up bars or tubing in level passline
- Removes elliptical sections of workpiece
- Imparts surface polish by pressure of rolls

RECENT significant development in the field of straightening machinery is a 7-roll guideless straightener which not only eliminates any deviation from true alignment in bars or tubing passed through it but also brings it into round and imparts surface polish to the piece in a single pass.

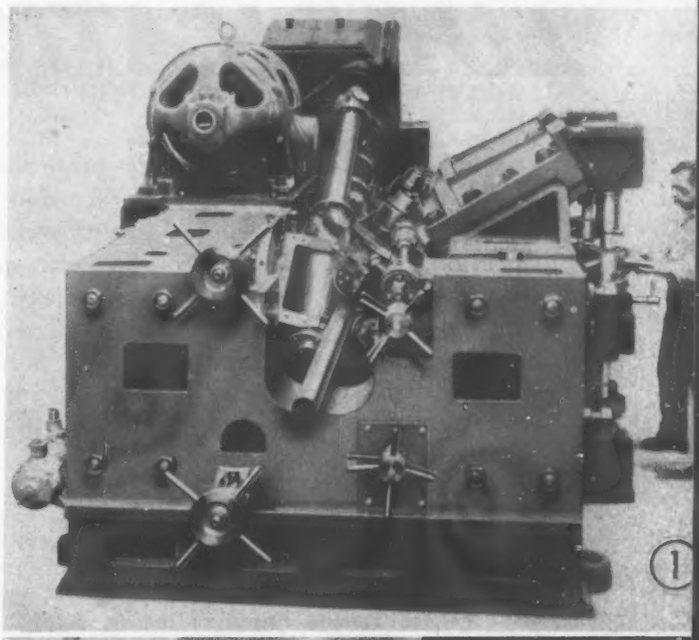
Built by Sutton Engineering Co., Pittsburgh, the machine consists of a 3-roll group at the entering end and a similar group at the departure end. An intermediate of these two groups is a single pressure or gag roll. Each group is comprised of a larger-diameter positively driven roll and two smaller-diameter idler rolls. The larger driven roll remains in a fixed position, while the two idlers are adjustable to accommodate various sizes within the range of the machine. This arrangement is illustrated by accompanying views, especially Fig. 2.

Positioning of the idlers is accomplished by means of a single hand-wheel attached to an adjusting screw having right and left-hand threads engaging screw boxes in the two swinging arms supporting the idler rolls. Swinging arms are pivoted at points lying on a line which bisects the angle formed by the two lines extending from the center of the pass and perpendicular to the center lines of the rolls. Inasmuch as the rolls must be angularly adjustable to give proper contact for the various sizes of work, and this adjustment is done about the center lines extending from the center of the perpendicular to the roll axis, it is imperative that center lines at all times coincide with the center line of the roll yokes. By positioning the pivot point as described, this requirement is satisfied. In other words, a perfect contact between rolls and material is obtained from all sizes within machine's range.

As a result of this combination of rolls, use of guides or shoes of any kind is completely eliminated. Tubes or bars passed through the straightener come in contact only with the smooth working surfaces of the rolls. For this reason, no scratching, rubbing, embossing or other surface markings occur. On finished materials, not only is the surface preserved but a definite polish is imparted by pressure of the smooth surfaces of the working rolls against the surface of the bar or tubing as it passes by.

The complementary grouping of three rolls permits the entrance of bars or tubes having sharp end kinks. Such bends as would not enter some straightening machines are said to enter this one with the ease due to the 3-point contact of the roll grouping. Further, the positive position of the stock in the passline produces a greater straightening effect than if guides or shoes were used.

On entering and leaving the machine, the bar being roll-straightened does not ride higher or lower, or lead to one side or another, but comes out of the machine directly in the passline. (See Fig. 1). Grouping of these three rolls also has a planned function in removing elliptical sections of the stock handled. The rounding up is effected by the greater surface coverage obtained by a 3-roll grouping over that of a smaller number. This machine has been designated the 2-KT Round Straightener.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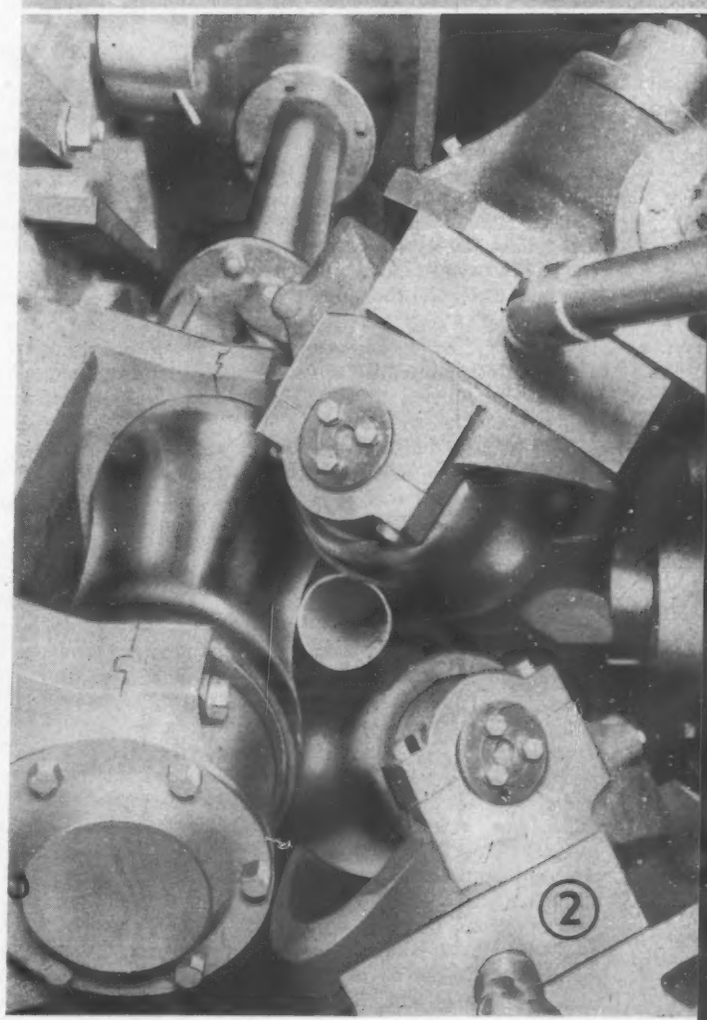
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Machine LUBRICATION

. . . can be made extremely profitable as shown by remarkable savings recorded from use of properly engineered centralized lubrication systems. Improved lubrication equipment provides outstanding economies by reducing time, manpower and lubricants required, while increasing bearing life and machine output

By G. W. BIRDSALL
Associate Editor, STEEL

REMARKABLE records of savings have been made by centralized lubrication systems. Perhaps typical of the possibilities of such equipment are the case histories reported by A. J. Jennings, vice president, Farval Corp., Cleveland, producers of Farval centralized systems of lubrication.

Cuts "Down" Time: An important saving accrues from increased machine output made available by eliminating the need for shutting down the equipment for lubrication. Centralized lubrication permits all points on a machine to be lubricated properly *while the machine is running.*

A Farval system was installed on a large Hamilton toggle press to lubricate 106 points, including all bearings, slides, crossheads, crosshead guides, air cushions, etc. without shutting down the press. Former hand lubrication required stopping the machine for 1½ hours. Making this time available for production is conservatively estimated as worth $50 daily.

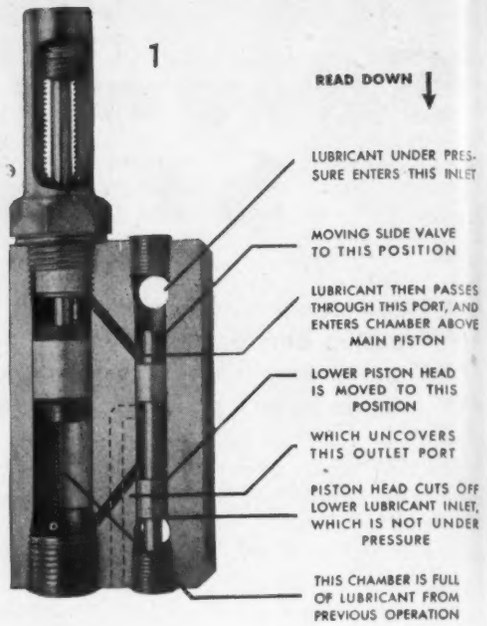
A large Bliss double-acting toggle press used to form radiator shells has 51 points lubricated by a Farval system. Instead of shutting down the press for 90 minutes daily, every point requiring lubricant is reached with the machine in operation.

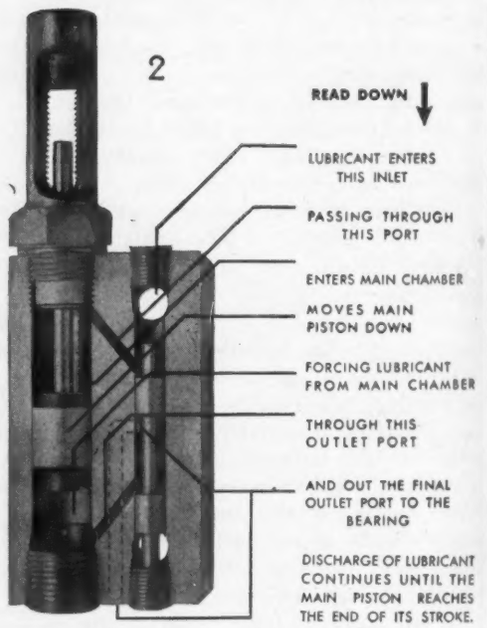
On a large mill rolling steel plate, it was necessary to shut down every 3 hours to lubricate. Elimination of this shutdown period made it possible to raise the output from an average of 320 to 445 tons per turn, an increase of 125 tons or more than 35 per cent.

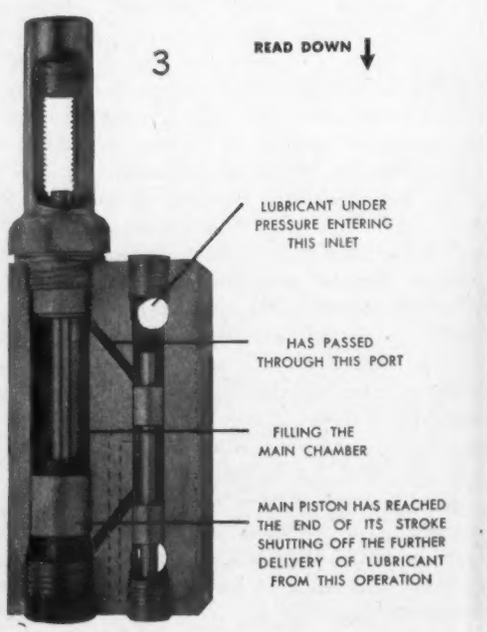
A Chicago stamping plant has a number of Henry & Wright dieing machines ranging from 10 to 300-ton capacity. These compact high-speed presses have principal bearings inside the frame. Twelve of these presses are hand lubricated and must be shut down every 4 hours for this job. In addition, a number of bearing failures have each cost from 8-16 hours' loss in production.

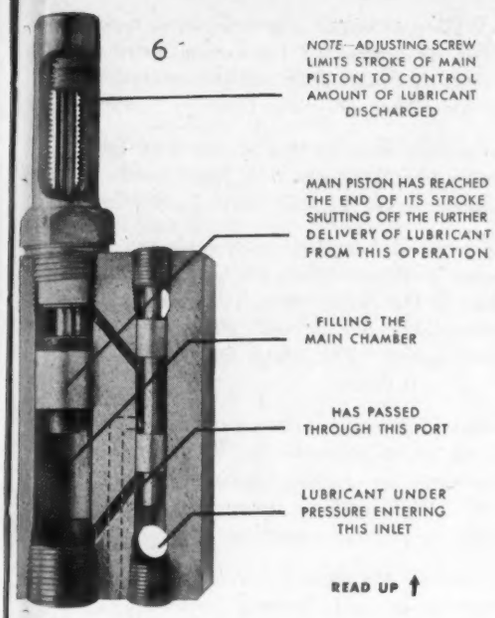
At this plant, five 50-ton machines of the same type were equipped with Farval systems. After running 14 months, 24 hours a day, without a single shutdown, these units were taken down to install a throttle stroke crankshaft. Inspection of the bearings revealed they were actually in better shape than when originally assembled, for they had higher polish and were in exceptionally good condition. The plant engineer reports 12 per cent more production from these machines and a 75 per cent reduction in cost of maintenance compared with identical hand-lubricated machines.

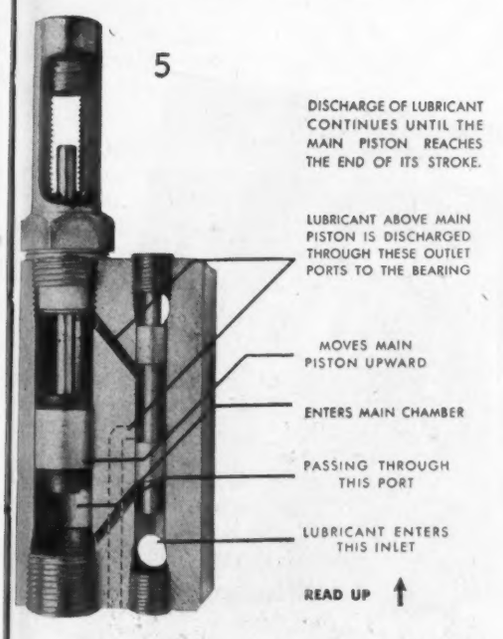
Rejections Reduced: An outstanding example of how more efficient lubrication can reduce rejections is the case where savings of $15,000 monthly are reported on an automatic lubrication system that cost less than $3000. Hot and worn roll necks on a rolling mill in one plant pro-

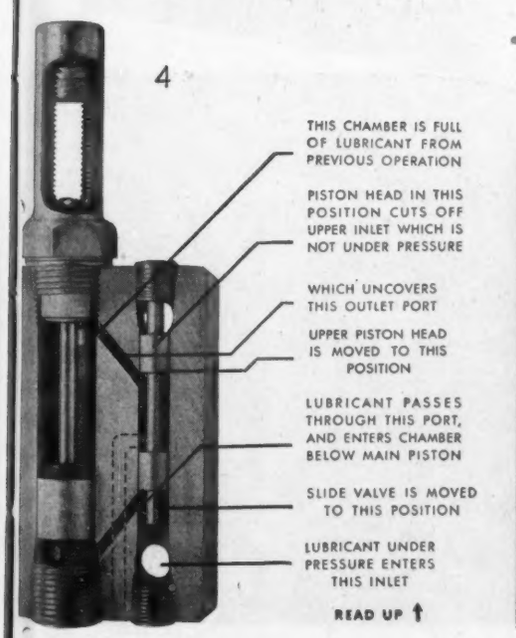

1
READ DOWN
LUBRICANT UNDER PRESSURE ENTERS THIS INLET
MOVING SLIDE VALVE TO THIS POSITION
LUBRICANT THEN PASSES THROUGH THIS PORT, AND ENTERS CHAMBER ABOVE MAIN PISTON
LOWER PISTON HEAD IS MOVED TO THIS POSITION
WHICH UNCOVERS THIS OUTLET PORT
PISTON HEAD CUTS OFF LOWER LUBRICANT INLET, WHICH IS NOT UNDER PRESSURE
THIS CHAMBER IS FULL OF LUBRICANT FROM PREVIOUS OPERATION


2
READ DOWN
LUBRICANT ENTERS THIS INLET
PASSING THROUGH THIS PORT
ENTERS MAIN CHAMBER
MOVES MAIN PISTON DOWN
FORCING LUBRICANT FROM MAIN CHAMBER
THROUGH THIS OUTLET PORT
AND OUT THE FINAL OUTLET PORT TO THE BEARING
DISCHARGE OF LUBRICANT CONTINUES UNTIL THE MAIN PISTON REACHES THE END OF ITS STROKE.


3
READ DOWN
LUBRICANT UNDER PRESSURE ENTERING THIS INLET
HAS PASSED THROUGH THIS PORT
FILLING THE MAIN CHAMBER
MAIN PISTON HAS REACHED THE END OF ITS STROKE SHUTTING OFF THE FURTHER DELIVERY OF LUBRICANT FROM THIS OPERATION


6
NOTE—ADJUSTING SCREW LIMITS STROKE OF MAIN PISTON TO CONTROL AMOUNT OF LUBRICANT DISCHARGED
MAIN PISTON HAS REACHED THE END OF ITS STROKE SHUTTING OFF THE FURTHER DELIVERY OF LUBRICANT FROM THIS OPERATION
FILLING THE MAIN CHAMBER
HAS PASSED THROUGH THIS PORT
LUBRICANT UNDER PRESSURE ENTERING THIS INLET
READ UP


5
DISCHARGE OF LUBRICANT CONTINUES UNTIL THE MAIN PISTON REACHES THE END OF ITS STROKE.
LUBRICANT ABOVE MAIN PISTON IS DISCHARGED THROUGH THESE OUTLET PORTS TO THE BEARING
MOVES MAIN PISTON UPWARD
ENTERS MAIN CHAMBER
PASSING THROUGH THIS PORT
LUBRICANT ENTERS THIS INLET
READ UP


4
THIS CHAMBER IS FULL OF LUBRICANT FROM PREVIOUS OPERATION
PISTON HEAD IN THIS POSITION CUTS OFF UPPER INLET WHICH IS NOT UNDER PRESSURE
WHICH UNCOVERS THIS OUTLET PORT
UPPER PISTON HEAD IS MOVED TO THIS POSITION
LUBRICANT PASSES THROUGH THIS PORT, AND ENTERS CHAMBER BELOW MAIN PISTON
SLIDE VALVE IS MOVED TO THIS POSITION
LUBRICANT UNDER PRESSURE ENTERS THIS INLET
READ UP

duced normal rejections of about 1.5 per cent in the form of bad gage variations, curved plates and plates running into the roll necks. Rejected material also slowed down other mill operations and reduced mill output.

Installation of an automatic lubrication system cut rejects to 0.5 per cent. On basis of rolling 300 tons of plates per turn, this 1 per cent saved 3 tons per turn, 9 tons daily. At $60 per ton, this amounts to more than $500 daily, or $15,000 monthly. Lubrication costs were cut 15 per cent also.

Longer Bearing Life: Records show that bearing life has been increased as much as 25 times, with 400-1000 per cent increases quite common. In one rolling mill, average life of a set of top roll bearings was just about long enough to roll 20,000 tons. After installation of a centralized lubrication system, more than 500,000 tons are rolled per set of bearings, a performance ratio of 25 to 1.

Average life of a set of bottom bearings was 40,000 tons, now increased to 180,000 tons, a 4.5 to 1 performance ratio. And these results were obtained in both cases while using the same bearing materials, same bearing design and same lubricant, so increased performance was attributed solely to the more efficient lubrication.

Since a set of four brasses for a pair of such roll bearings weighs about 2400 pounds, the increased life saves more than 190 tons of bearing-metal at a conservative figure of $15,000 per year.

On another and larger plate mill, tonnage rolled per bearing change has gone from an average of 4000 to 220,000 tons, *a performance ratio of 55 to 1.* Bearing metal saved here runs around 400 tons or about $32,000 annually.

Power Savings: Reduced friction at the necks of these rolls through positive lubrication at all times accounts for the remarkable increase in bearing life outlined. Lower friction is evidenced by power readings. On one machine, for instance, peak loads registered 800-900 amperes with running load of 700-800 amperes. With centralized lubrication, peaks are now 600-650 amperes with running load of 400 amperes. At least a 10 per cent power reduction is recorded on practically every installation of centralized lubrication, it is reported.

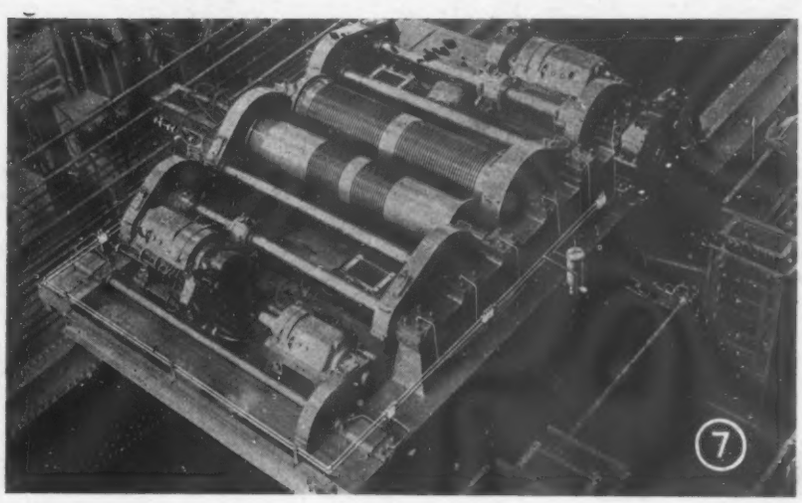
Records of power costs on a 40-inch blooming mill show a saving of 3 cents per ton of steel rolled upon installation of a lubricating system. During one year with hand-packed roll necks, power costs were $42,300 for an output of 470,000 tons—about $9000 per 100,000 tons rolled or 9 cents per ton.

After installing centralized lubrication, power costs for a year were $37,170 for 630,000 tons, or $5900 per 100,000 tons rolled (5.9 cents per ton). Savings were therefore $3100 per 100,000 tons, or $19,530 in power saved per year, as compared with $5500, the cost of the lubricating system installed.

Saves Lubricant: Centralized lubrication systems are equipped with individual metering devices at each point to be lubricated. These feed just the amount required at that particular point. Valves are adjustable

Figs. 1 to 6—Explanation of operation of the Farval metering valve. Note it has only two moving parts. This extreme simplicity makes for reliable operation

Fig. 7—Two Farval systems serve 30 points of lubrication on this 40-ton Harnischfeger crane and assure proper lubrication without necessity of climbing all over the unit



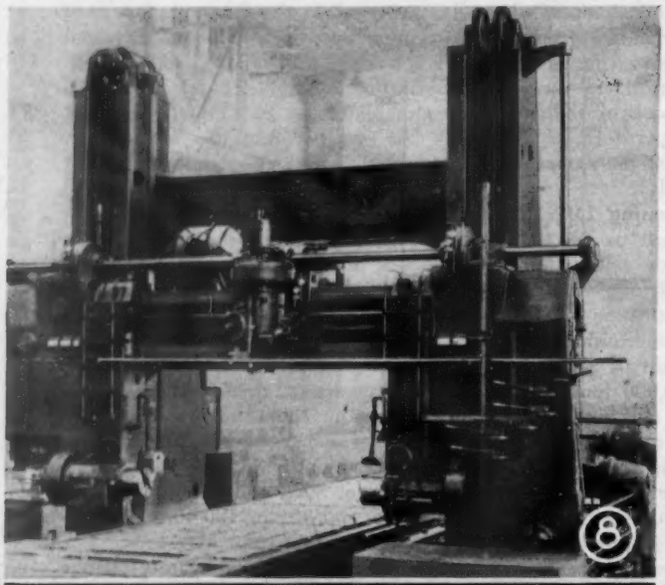


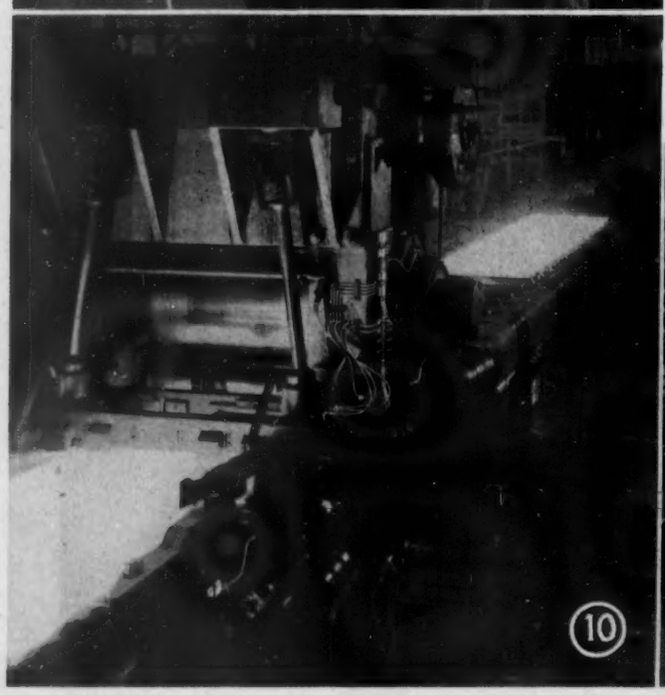
Fig. 8—This 146 x 96-inch 3-head Ingersoll planer type milling machine has six centralized lubrication systems which serve 187 points with lubrication and help minimize time out for maintenance and repairs

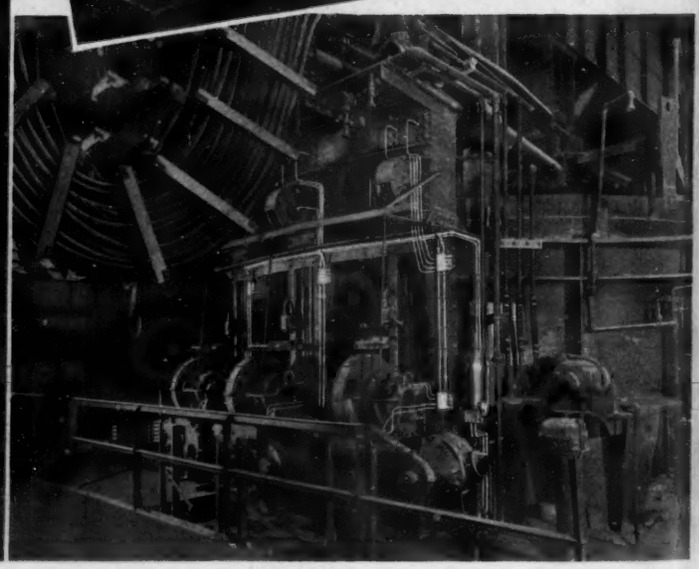
Fig. 9—Note the flexible lines to ram of this 1000-ton Lake Erie hydraulic forming press at a large bomber plant. A Farval system serves 40 points with lubrication

Fig. 10—Lack of proper lubrication can quickly tie up important production facilities. That is why roll stands and conveyor tables in this Mesta 96-inch hot strip mill line have 192 points lubricated automatically at regular intervals by a Farval system. The 4-high roughing stand is shown

Fig. 11—A centralized lubrication system makes frequent and proper servicing of 54 points on the drives of this 70-ton Herroult electric arc melting furnace a simple positive operation. High ambient temperatures thus present no particular problem

Fig. 12—Simply working the lever conveniently located at floor level (operator at right) permits lubricating 92 points on this No. 796½ Toledo toggle press





to cover wide range of bearing requirements.

By thus eliminating "over" lubrication, amazing savings have been produced. For example, a group of large mechanical stamping presses have 713 points lubricated by 24 Farval systems. Hand lubrication formerly required 30 pounds of grease; now 4½ pounds does the job, a saving of 85 per cent.

On rotary milling machines in a Detroit plant, a similar system daily lubricates 42 bearings per machine with only 6 ounces of semi-fluid oil instead of 12 gallons formerly required, a saving of 1530 ounces out of 1536 or more than 99 per cent. In addition, the semi-fluid oil (which could not be used with the previous hand lubrication system) eliminates trouble experienced with oil running onto the cutters from the vertical spindles.

What is more, instead of being shut down for repairs twice monthly (an average), spindle bearings operate 16 months or more. Important savings from increased output and lower maintenance costs are evident.

Time Savings: Because up to 3000 bearings can be lubricated in a few minutes from one point by a single operator, centralized systems produce amazing savings in lubrication time. For instance, a machine with 656 bearings required lubrication every 20 minutes, keeping a crew of six oilers busy. Now a Farval system permits one man to do the job in 15 minutes, and an automatic timer and motor driven pump could do the work without any attendance at all, if desired.

This time reduction can be extremely important in many plants. Four systems, serving 178 bearings, save $1600 per year in one plant from this single factor.

A large milling machine with a bed over 100 feet long required one oiler on each shift, three per day. With an automatically timed and power-driven system, 212 points on the machine are supplied positive lubrication with no attendance whatever. And instead of 6 gallons of oil, just 1 pint of semi-fluid oil is consumed daily.

Complete Safety: Mr. Jennings points out that the hazard of hand lubrication is directly responsible for a high percentage of all industrial accidents. In spite of the progress made through safety campaigns, this loss can not be eliminated as long as men must climb all over machines to lubricate them.

Perhaps this hazard is greatest in lubricating overhead cranes. Just recently a crane operator in Buffalo fell from his crane while lubricating it. His death resulted in an $18,000 compensation charge. Other dangerous equipment such as blast furnace tops, ore bridges and large power presses offer similar hazards which are completely eliminated with centralized lubrication, for then the operator does not leave the floor or his control station to lubricate the entire machine.

Assured Service: As on cranes and other overhead equipment, it is next to impossible to supervise lubrication of much heavy duty equipment—equipment that is especially vulnerable to inadequate lubrication. Typical of what happens to cranes is the case where a number of roller bearing cranes were operated on the same runway. Some of the cranes were equipped with centralized lubrication systems, others were not. After six months' operation, replacement of bearings on two of the hand lubricated 30-ton cranes amounted to $800. There was nothing wrong with those bearings except that they had failed to receive proper lubrication.

Metalworking plants and rolling mills where many different types of bearings and lubrication methods have been tried feel it is better to lubricate all the bearings on the bridge or trolley from one place, usually the cab, and to establish a definite schedule for lubrication, reports Mr. Jennings. Plain bearing cranes are usually lubricated once a day with the proper size measuring valve, roller bearing units being lubricated once a week with a much smaller valve.

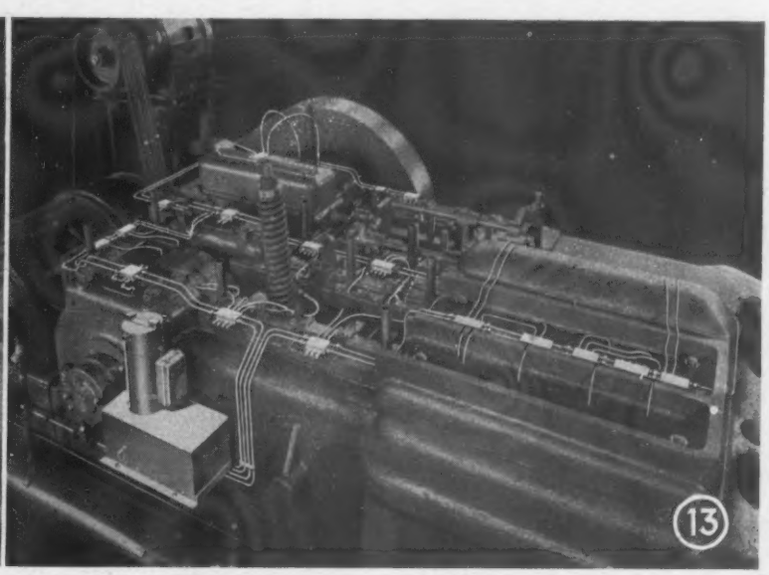
Result when cranes are lubricated properly is that maintenance delays are reduced as much as 50 per cent. Equally important, cranes and runways are always free of lubricant, drippage of excess lubricant on the products being handled is eliminated, hazard of climbing all over the crane to service the bearings now no longer exists, production delays and maintenance expense due to breakdowns are stopped. Where a single crane serves important pro-

(*Please turn to Page* 128)

Fig. 13—*Heavy duty* 4-*inch Acme XN upset forging machine employs full automatic Farval system to lubricate* 58 *points including slides. Accomplished without attention, such automatic lubricating setups have made production savings*

Fig. 14—*This large Olaffson automatic snag grinder handling cylinder blocks has* 18 *points lubricated from floor level by means of a centralized system*

Fig. 15—*Operator serves* 34 *points with lubrication on this No.* 50-*A Quickwork shear in a few minutes by a centralized lubrication system*



Lubrication in Deep Drawing Metals

By SAMUEL SPRING
Associate Chemist
Franford Arsenal Laboratory
Philadelphia

General properties of drawing lubricants and their composition are reviewed in concluding article of this authoritative treatise. Specific topics include reduction of friction, ease of application and removal, stability, noncorrosiveness and economy

FLOW of metal during drawing operations in most cases is facilitated by reduction in frictional resistance. This effect is beneficial. For example, considerable impedance by excessive friction toward flow between work and dies may result in rupture of the work due to something similar to tensile failure when part of the work is held at the die and remainder is free to move. Not only can this type of difficulty result in tensile failure, but occasionally it can result in reducing thickness of the wall of the object being fabricated and thus result in failure during performance.

While reduction in friction is almost always beneficial with regard to metal flow, there occasionally are cases in which this is detrimental. For example, in punching out cups, Swift [49] mentions that a great reduction in friction between punch and work frequently results in excessive movement of the metal so that rupture of work may occur. The proper flow of metal is most important in cases where hollow bodies are being formed from metal sheet in such manner that wall thickness of the bulk of the metal is not changed but stretching takes place over a limited area. Under these conditions, it is desirable to have this stretching take place over an area as large as possible. Friction reduction is generally beneficial in providing this action, but, because of this localized stretching, it is possible to have too rapid a flow of metal in some local region, resulting in ruptures.

In one case recently studied, dimensional control of the work is not possible until a certain amount of metal has been built up on the dies. The increased frictional resistance results in better holding of the metal in certain regions of the die. It should be emphasized, however, that this condition is not frequent and might be avoided by redesign of tools.

Differences between the two types of frictional resistance should be kept in mind, i.e., resistance due to welding and that due to shear resistance of the lubricant. It is possible to attain various magnitudes of frictional resistance by increasing or decreasing the shear resistance of the lubricant without sacrificing tool life due to weld formation for those cases in which high frictional resistance is necessary.

The effect of different degrees of lubrication on different portions of metal being drawn has not been studied very much, but some results obtained by the writer indicate that this may be of great importance. Thus it was observed that variation of the quality of the lubricant on either the inside or outside of brass cartridge case pieces resulted in peculiar variations in drawing forces at different stages of the drawing process, indicating that the flow of metal might be changing as a consequence of changes in friction. Moreover, Swift [49] has found, in the cupping of disks, that a greater number of ruptures occurred when the top of the disk was well lubricated. The smallest number of ruptures took place when the bottom of the disk was well lubricated and the top was poorly lubricated. This effect has been confirmed in the case of the redrawing of brass cartridge case pieces. This subject might provide a fertile field for research investigations.

Properties of Drawing Lubricants [48, 54, 55]

Weld Prevention: Depending upon the severity of the drawing operation, it is necessary to use a combination of the welding prevention methods discussed. While increased improvement is usually obtained as the number of weld preventives is increased, a limit is reached by practical considerations such as ease of application, unit cost and occurrence of mechanical failures. Welding prevention is the most important single requirement for a drawing lubricant and has been adequately discussed in previous paragraphs.

Lubricant Friction Reduction: Sufficient quantities of polar lubricants should be available for reduction of lubricant friction or shear resistance of the lubricant. This requisite, plus welding prevention, must be satisfied before any of the following requisites assume any appreciable importance.

Ease of Application: Flowing of the lubricant over the tools and work is generally the most convenient method. Dipping methods are somewhat less convenient. Use of fillers often is inconvenient as most of these require agitation to keep the filler in suspension, and tend to clog pipes and feeding mechanisms. The greatest difficulty occurs in the case in which deposits of low melting solid lubricants, nonferrous metals, or stable chemical compounds are applied to the work prior to drawing; but these techniques, nevertheless, are highly desirable for difficult drawing operations.

Ease of Removal: In many cases lubricants are selected on the basis of ease of removal, even when other superior lubricants are available for the operation. While ease of removal must be balanced against performance, emphasis should be on lubrication performance. Considerable attention should be paid to the methods for removal of good lubricants. It has been found that many instances in which lubricants are not used because of difficulty of removal can be cleared up readily by use of appropriate cleaning methods without great adjustment of the cleaning equipment. Failure to emphasize good lubrication rather than easy removal is generally quite expensive in terms of tool life and quality of the finished product.

Stability: Certain lubricants tend to become rancid and, where this is due to bacterial decomposition, it is frequently possible to minimize this effect by the use of appropriate germicides. In other cases, bacterial growth may be checked by means of a process similar to pasteurization of milk. Considerable care should be taken to store emulsion type lubricants under conditions in which temperature is neither too high nor too low. Rapid changes in temperature should be avoided especially since this tends to break emulsions. It has been found that the stability of emulsion-type lubricants can be greatly improved by the use of a homogenizing process as in

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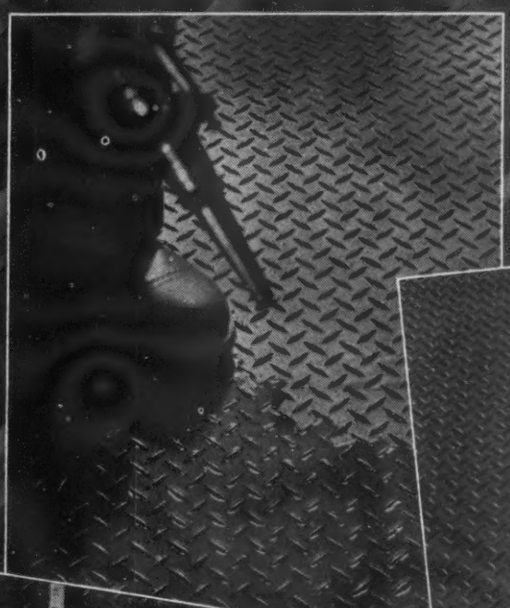

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a colloid mill. Many manufacturers are now utilizing this treatment.

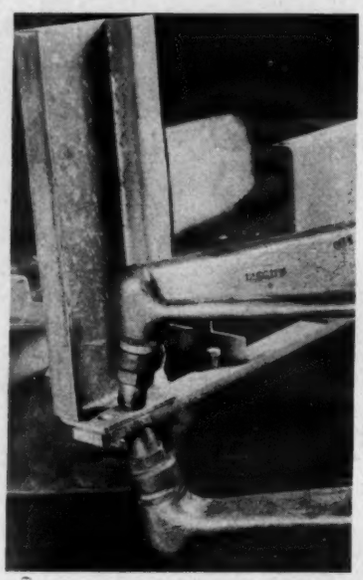
Noncorrosiveness: Lubricants must be carefully checked for corrosiveness, especially when high concentration of fatty acids and extreme pressure additives are present. In the case of aluminum and zinc, highly alkaline lubricants must be avoided, and it is for this reason that soap emulsions generally are not used in the fabrication of aluminum parts. It is usually a good idea to follow most drawing operations with a cleaning operation to remove the lubricant as soon as possible to reduce the possibility of corrosion. This applies directly when heat treating procedures are used, as the high temperatures facilitate corrosion.

Freedom From Physiological Effect: While certain people are allergic to certain of the constituents of drawing lubricants, the occurrence of dermatitis, which has been associated with drawing lubricants, has been found by Public Health Service to be due mainly to contamination of the lubricant with bacteria or with defatting of the skin. In the former, bacteria are introduced into the lubricants by carelessness on the part of a worker or lack of cleanliness of the worker's skin. In the latter case, in which the skin is defatted, difficulties may be eliminated by use of appropriate protective creams of which a large variety are now available. Lubricants containing white lead should be avoided and, at the present time, there are available an ample number of nontoxic substitutes that give equal performance.

The materials frequently added to drawing compounds to mask odors due to improperly compounded reactive constituents, or rancid fatty materials, serve a real purpose so far as psychological effect is concerned, but when added in excessive quantities, might have an adverse physiological effect. For example, one problem was brought to light in which a pungent material was emitted from a lubricant emulsion upon passing steam through it for the purpose of facilitating dilution with water. It was found that this was due to the presence of napthaldehyde substituted for benzaldehyde as a deodorant. The vapor pressure of the naphthaldehyde is less than that of benzaldehyde at room temperature, and consequently a larger quantity was used to obtain the same deodorization. However, the naphthaldehyde is distillable with steam and, consequently, it all came off when the compound was diluted with water at high temperatures. This was sufficient to cause the temporary hospitalization of several employes.

Economy: It is fairly obvious that the cost of drawing lubricants must be balanced against operation costs and that it is false economy to reduce cost of the lubricant if this results in decrease in the life of tools or in the quality of the finished product. On the other hand, high cost of lubricant is no guarantee of high quality, although many metal processors have utilized this as a criterion. In addition, proprietary formulas generally are overpriced, whether they represent the best material for a particular job or are not especially suitable.

It has been the writer's experience that after the fundamental principles of drawing lubrication are applied in selecting lubricants for various drawing operations, not only is tool life and quality of product improved, but there is usually a considerable decrease in cost of the lubricant. This is especially true when simple materials, which can be made up at the shop, are utilized in place of proprietary formulations. The use of the appropriate simple materials is not especially difficult if these principles of drawing lubrication are kept in mind.



SPOT BRAZING COPPER: Large copper sections which cannot be passed through a press-type welder because of size or shape are joined by a welding gun at Westinghouse. As copper is a low resistance metal, molybdenum tips are used to supply the necessary heat, by conduction, to parts being brazed. Recirculated water serves as refrigerant

Another possibility frequently ignored in the use of superior drawing lubricants involves reduction in the number of operations required. It is economical to pay more for the lubricant if savings of this sort can be accomplished. Still another consideration involves the removal of the lubricant, and it is sometimes possible to effect savings in these operations by proper selection of the lubricant, provided the performance of the lubricants is the same.

Types of Drawing Lubricants

Drawing lubricants may be classified as follows:

1. **Soap and Water Dispersions.** It has been established [49, 56] that lubrication by soap dispersions is supplied almost entirely by acid soap present as a dispersed insoluble powder resulting from hydrolysis. The hydrolysis of soap may be represented as follows:

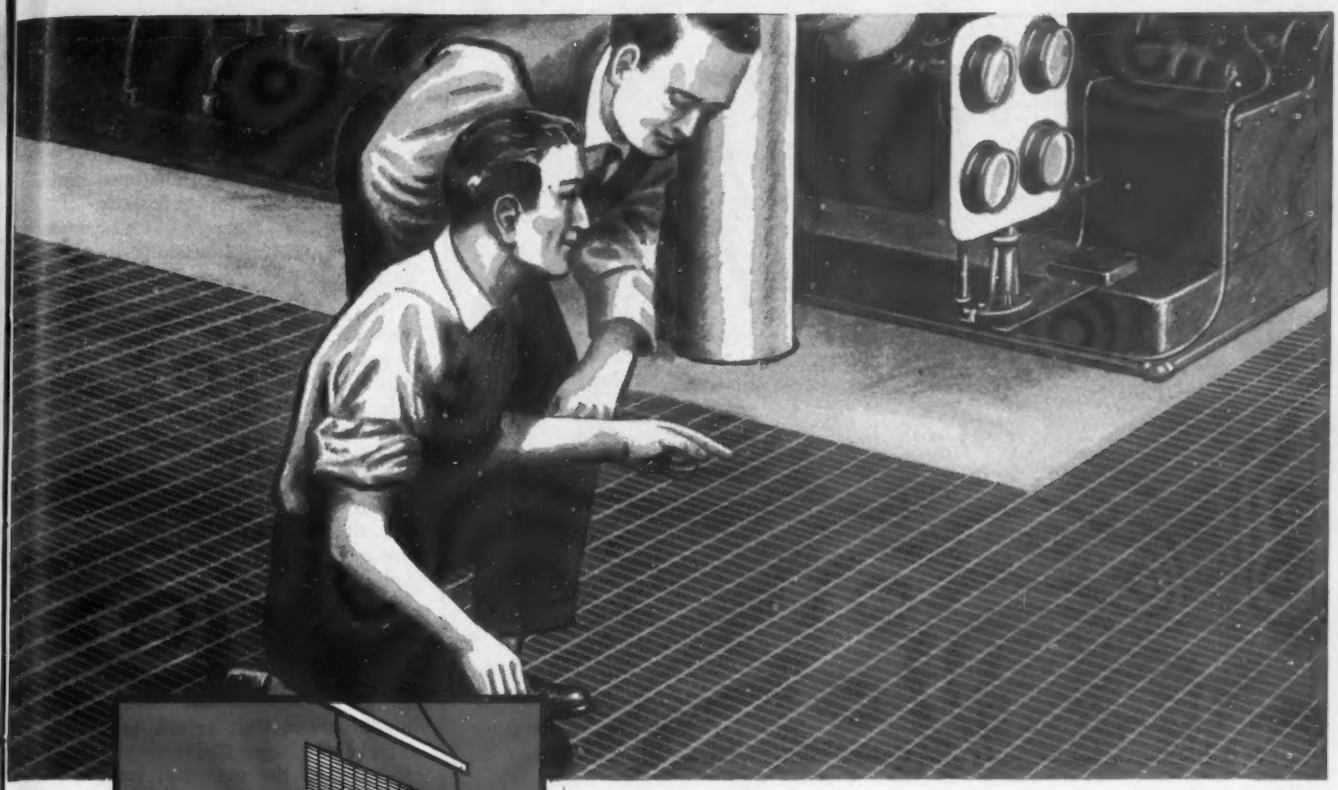
$$Na\,S \rightleftharpoons Na^+ + S^-$$
(soap) (fatty acid ion)
$$H_2O \rightleftharpoons OH^- + H^+$$
$$\rightleftharpoons$$
$$+ HS + NaS \rightarrow NaS \cdot HS$$
(acid soap)

This hydrolysis is the cause of the high alkalinity (pH = 10.2 to 11.0) of "neutral" soaps when dispersed in water at low concentrations. However, any appreciable excess of alkali should be avoided as this represses the hydrolysis. The acid soap (formed as above) being only slightly soluble, the above reaction proceeds to an appreciable extent depending upon the concentration and temperature; the lower the concentration and the higher the temperature, the greater the hydrolysis, except insofar as the solubility of the acid soap is increased at higher temperatures. The soaps that are generally recommended for use as drawing lubricants have fatty acids of relatively high titer (solidification point), made from fats rather than oils.

Since these soaps form acid soaps that are less soluble than those formed from low-titer fatty acids, this recommendation is ordinarily a proper one. However, any soap can be used if attention is paid to accomplishing maximum hydrolysis, such as by using low concentrations. While practically complete hydrolysis can be attained by sufficient dilution, the formation of an effective lubricant dilution should be stopped considerably before this point to have a certain amount of unhydrolyzed soap available to disperse the acid soap, so that it can be carried to the metal surfaces. It might be mentioned that many metal-forming establishments consider that a soap having a heavy gel structure is necessary and use the "slippery" feeling obtained with such dispersions as the criterion of a satisfactory lubricant. While it is frequently true that soaps that tend to form heavy gels also are the most effective producers of acid soap, it is generally advantageous to utilize these soaps at such a low concentration that the gel structure does not form.

2. **Soap, Fatty Acids and Water.** As the effective constituent of soap dispersions is the acid soap, it appears obvious that addition of fatty acids to increase the acid soap content would supply more efficient lubricants. This improvement has been observed in laboratory performance tests [56], although its magnitude is limited, but this type of lubricant has not been employed widely in metal drawing.

3. **Soap, Fatty Oil or Fat, Free Fatty Acid and Water.** This is the conventional type of drawing lubricant and is used extensively for all sorts of drawing operations under various proprietary names. While the free fatty acid may be added, it is more customary to utilize fatty ma-



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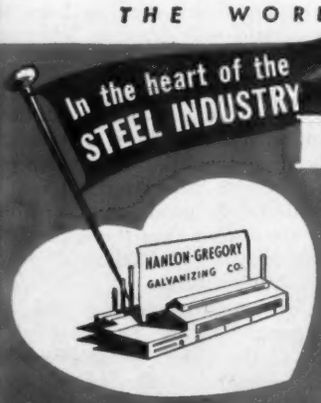

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FLOATING CRANE: A 100-ton floating crane built by Dravo Corp., Neville Island, Pittsburgh, in final stages of assembly in Alexandria, Egypt. When functioning, it will transport 75-ton locomotives for the armed forces from shipboard to quayside. Crane base is an all-steel barge, 200 feet long, with beam of 78 feet. Crane has 135-foot boom with 360-degree transverse

terials that are partially decomposed into fatty acids, because this enables the use of cheaper materials. It has been claimed that the fatty acid is added to "wet" the metal, but it is more probable that the soap and fatty materials are acting as a vehicle for this free fatty acid which lubricates by the formation of polar adsorbed films. Other portions of the lubricant, notably water, also contribute toward lubrication during drawing.

It is advantageous to use as much fatty acid as possible without causing excessive corrosion. Relatively large variations in soap and fat content usually cause little change in lubrication properties and it appears that one of the main functions of the fat or fatty oil is to form an emulsion with the soap and thus inhibit the natural foaming tendencies of the soap dispersion. It has been found, in many cases, that the use of soap dispersions in conjunction with an antifoaming agent is equally satisfactory to this conventional type of drawing lubricant.

4. **Soap, Mineral Oil and Water.** In lubricants of this sort there is a change in the physical properties of the soap due to the formation of the emulsion including foam reduction, but the sole source of fatty acids is still the soap. It has not been determined whether the tying up of the soap in the emulsion causes a decrease in the available free fatty acid. This type of lubricant has been used mainly as a coolant.

5. **Soaps, Mineral Oil, Fatty Acids and Water.** In lubricants of this type, the mineral oil is used as a vehicle for the fatty acids and for changing the physical properties of the soap by formation of an emulsion. The mineral oil frequently is used surreptitiously in place of the fatty oil of the lubricant listed ahead in item 3, because of the physical similarity between the lubricants. However, some of these lubricants compare favorably in performance with the emulsions containing fatty material. In fact, these lubricants should have certain advantages since the absence of fatty material should cause a reduction in the cost of the lubricants, and should reduce rancidity. However, this reduction in costs is not passed on to the consumer in many cases.

It should be mentioned that mineral oil frequently is substituted only partially for the fatty material in the lubricant described above. In this case, it is usually intended as an adulterant, but from a practical standpoint there is very little difference in performance and this practice may be condoned, if at least part of the cost reduction is passed on to the consumer.

The lubricants mentioned in items 1 to 5 may be used as substrata for the addition of other constituents required for lubrication in severe drawing operations. These additions may contain reactive constituents such as sulphur, chlorine and phosphorus in their various stages of reactivity, fillers, etc.

6. **Lubricants of the Preceding Types Plus Reactive Constituents.** While chlorine and phosphorus are used to a certain extent, the most common reactive constituent which is added to water base emulsions is sulphur. When sulphur is used in its elementary form, it functions partially as a reactive constituent and partially as a filler. The sulphur added as a portion of sulphurized oils may have initially varying reactivity. However, because of the high alkalinity of soap emulsions, there is a considerable reduction of reactivity of each of the sulphurized oils in comparison with the same oils in oil or water. In fact, the reactivity of chlorine and phosphorus bearing compounds are sometimes reduced so much by the high alkalinity of soap dispersions that they are ineffective as extreme pressure lubricants in this medium.

7. **Lubricants of the Types Reviewed Plus Fillers.** Fillers most frequently used are chalk, lithopone, zinc oxide, clay, white lead, flour, yeast, bran, talc, graphite and mica. These materials tend to separate mechanically the metal surfaces insofar as they can adhere or can be trapped between these surfaces which are being subjected to high shearing stresses. One consideration of the use of compounds containing fillers involves the tendency for sedimentation to take place, thereby removing the filler from the sphere of action. This being the case, it is usually necessary to use these emulsions in concentrated forms so as to increase the viscosity of the medium and thus retard sedimentation. Thickening agents also may be utilized to increase the viscosity, some of them being starch flour, gelatin, and sodium alginate.

Usually, two types of inorganic fillers are employed, namely, those that pulverize upon being subjected to high pressure and those that have weak cleavage planes so that slippage along these planes takes place when they are subjected to high shearing stresses. Examples of the former are chalk (whiting), lithopone, and white lead. Examples of the latter are graphite, talc and mica. The first type results in greater lubricant friction than the second but is probably more efficient as mechanical separators of sliding surfaces. In the latter case, the force required to cause slippage at the weak cleavage planes is usually relatively small so that impedance to motion is not as great as in the case in which a crystalline material must be completely crushed before motion can take place.

In the use of fillers in soap and water media, attention must be paid to the solubility of the fillers, so that soap is not precipitated as alkaline earth or heavy metal soaps. This difficulty is experienced to a great extent with gypsum. Organic fillers such as bran are used in certain wire-drawing lubricants and offer the advantages of high adhesiveness and softness.

It has been found that a good many lubricants containing fillers contain surprisingly large quantities of abrasive particles due to the use of natural sources of the fillers. A good many of these particles are coarser than the bulk of the filler since they are ground with greater difficulty. Nevertheless, a considerable number of abrasive particles are frequently present in the effective sphere of action of the fillers. This effect has not been completely evaluated, but some work has indicated that in metal drawing

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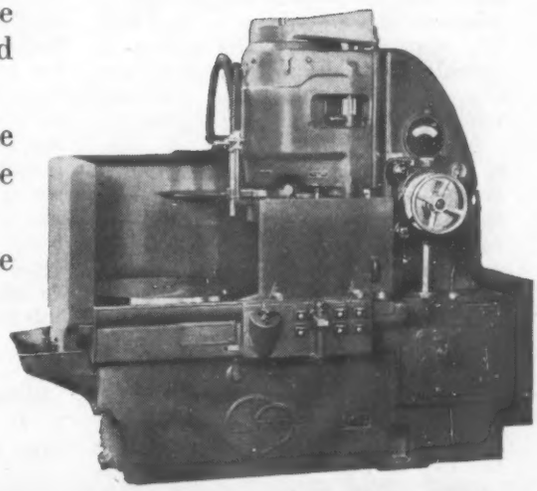

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these abrasive particles are less detrimental than would be expected. In certain instances it is even desirable to have a filler that is somewhat abrasive so as to prevent excessive slippage of the metal [58].

8. **Lubricants Containing Emulsifying Agents Other Than Soap.** In cases in which emulsions must be manufactured, or used with hard water, it is possible to utilize other emulsifying agents than soap. While these emulsifying agents have good surface active properties, they are frequently relatively poor lubricants and are inferior to soap from this viewpoint. This also applies to "soluble oils" widely used for metal cutting which generally have petroleum sulphonates as emulsifying agents.

9. **Mineral Oil.** Mineral oil alone is quite unsatisfactory as a drawing lubricant, except for the mildest drawing operations. Even in these cases the mineral oil should be not very well refined since the small amount of polar material present in crude oil, which provides some boundary lubrication properties, tends to be removed during the refining process. Mineral oil obtained from some crude oils such as "Smackover Crudes" contain relatively large amounts of sulphur. Although of very low reactivity, this sulphur imparts some small extreme pressure lubricant properties to these oils. The cooling properties of petroleum oil base lubricants are dependent to a considerable extent upon the viscosity of the oil, which should be low for better cooling, although not so low that the flash point is below 275 degrees Fahr.

10. **Fatty Oil.** Fatty oils have been used quite extensively in deep drawing operations, the most commonly used material being lard oil. It appears that water base lubricants can be substituted for fatty oils without any loss in performance in many cases. Consequently fatty oils are rapidly being displaced as drawing lubricants inasmuch as they cannot compete with the water base lubricants on the basis of cost and ease of removal. In most cases in which fatty oils are used, it is possible to substitute mixtures of fatty oil and mineral oil, provided the free fatty acid content and type is adjusted so as to be the same, and the percentage of fatty oils is not too low. The advantages of mineral-fatty oil combinations over straight fatty oil are lower cost, less gumming, and less rancidity. There is some evidence that the performance of fatty oils is governed to a great degree by the amount and type of free fatty acids present as a result of hydrolysis of the oils by bacterial or other action, but there are other constituents that make important contributions toward lubrication.

11. **Oil Base Lubricants Plus Reactive Constituents.** Additives containing sulphur, chlorine or phosphorus frequently are incorporated into the oil lubricants discussed to supply lubrication under more severe drawing conditions. In these cases minor percentages of fatty oil may be used advantageously, the mineral oil acting as a vehicle for the reactive constituents and the fatty oil yielding a polar lubricant to reduce friction due to the stress deformation of the lubricant. Reactive constituents of varying activity may be used to fit the severity of the drawing operations.

12. **Oil Base Lubricants Containing Fillers.** Fillers may be incorporated into the lubricants considered to increase their weld preventive properties. One lubricant which was extensively used in the early phases of deep drawing was white lead plus linseed or castor oils. The use of this lubricant has been practically discontinued because of the poisonous nature of the white lead and the difficulty of removing the lubricant. Chalk (whiting) is now used extensively as a filler for oil base lubricants and lithopone frequently is used as a substitute for white lead. Other fillers are mica, talc and graphite, particularly the last named. Colloidal graphite in mineral oil has found wide application.

13. **Low-Melting-Point Solid Lubricants.** In the case of wire drawing in which a "sull" or rust and lime coating is employed, it is customary to utilize powdered soaps as the lubricant applied at the dies. In this case, the wire is allowed to dip into the soap powder which then adheres to it. This is carried to the dies and generally is converted to a transparent, adherent coating which frequently enables the wire to be drawn through several dies without relubrication. Since it is necessary for the soap powder to adhere to the wire in order to be carried into the dies, one of the most important properties that soap powder must have is resistance to absorption of water in the atmosphere. This would result in clumping of the soap powder. For this reason soaps used for this purpose should be substantially free of glycerine [59] or other humectents and soap builders such as soda ash or borax frequently are added.

These built-up soaps often are relatively ineffective in water media because of the prevention of hydrolysis by the excess alkali of the soap builder. Great care therefore should be exercised in attempting to utilize soaps designed for dry wire drawing in wet drawing. In an extensive study of wire drawing soaps, Francis [59] found that sodium soaps high in saponified fatty acid content and low in glycerides and moisture were best, while potassium soaps were very poor.

While soap is used in powdered form for wire drawing, in certain other deep drawing operations it has been advantageous to utilize dried soap coatings that are introduced on to the surface of the work by immersion of the work in a hot concentrated solution of soap, followed by air drying or baking. This results in a thick coating, in comparison with boundary films, of a material that is readily plastic and is probably changed to liquid form during the drawing operation [23]. The decrease in the coefficient of friction and prevention of welding due to the attainment of thick film lubrication results in long tool life and low power consumption.

In using this technique, it is necessary to attain good adherence to the basic metal. For this reason the surface of the metal must be clean, and it has been advantageous in at least one instance to have the surface slightly roughened. For

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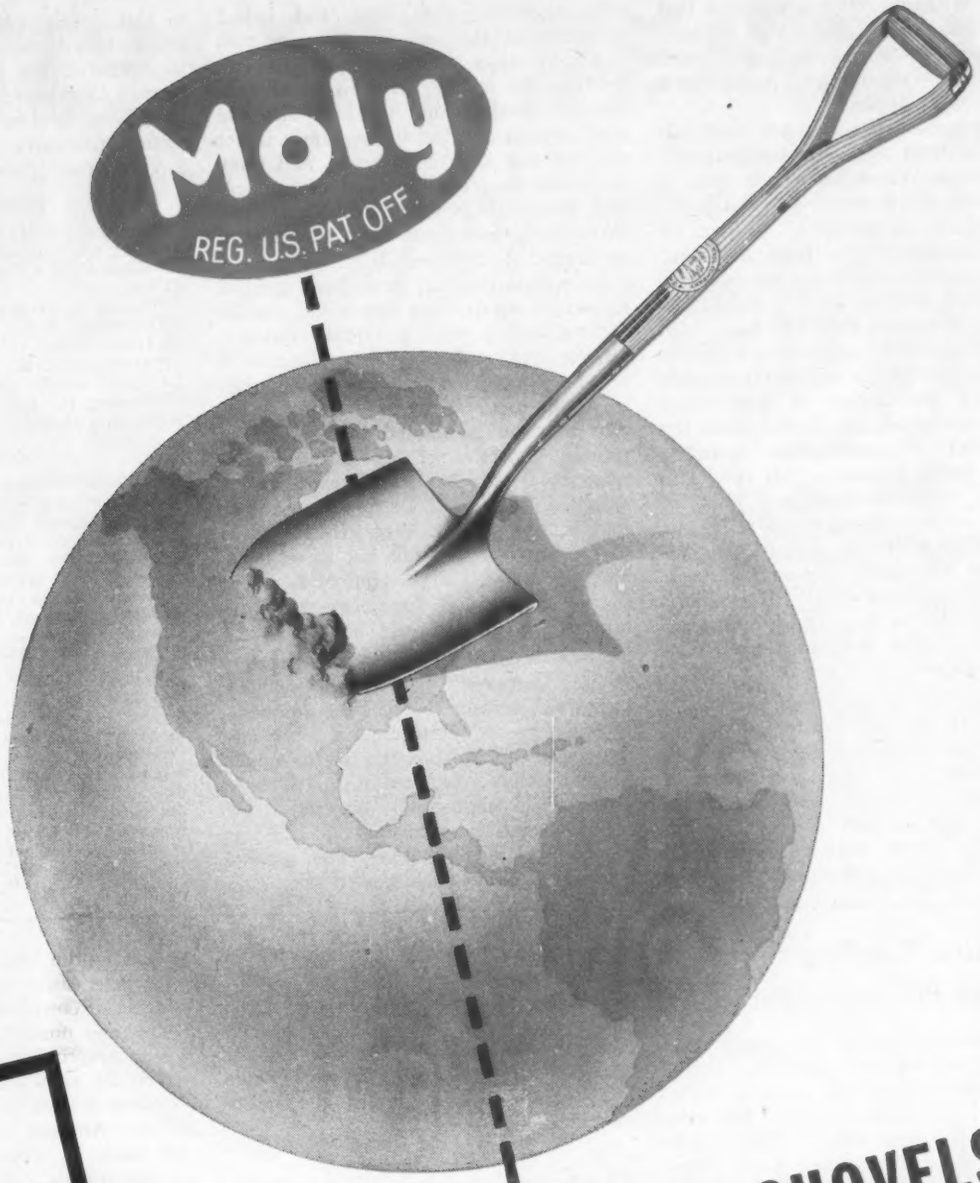

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example, Williams [53] has reported that the application of a light film of mineral oil prior to a wax coating resulted in failure to obtain the good performance of dried wax deposits.

It is possible to use other materials in place of dried soap with similar beneficial results. Waxes have been used in this manner, either deposited from a solvent or from an emulsion. Fillers or reactive constituents, or both, also may be incorporated into these emulsions.

14. **High Melting Point Solid Lubricants.** A lubricant that has been used for severe drawing operations on ferrous metals consists of the stable compounds formed by the action of sulphurized oils or fats—which are heated with the metal—with a considerable quantity of water being present. This results in a film of stable chemical compound of sulphides or partially oxidized sulphides. Corrosion is inhibited and friction reduced by the layer of oily material formed at the same time. This lubricant frequently is used alone, but occasionally a coolant is circulated in conjunction with it.

Coatings of rust formed in such a manner that the oxide is hydrated, and therefore not abrasive, are used widely as deep drawing lubricants in conjunction with liquid lubricants containing polar molecules such as fatty acids. The sull coating used in the wire drawing industry is of this type, although this is used in conjunction with lime and baked to neutralize the acid which causes rust and to remove occluded hydrogen embrittling the metal. In the case of nonferrous metals, oxide coatings also are used extensively, but it frequently is not realized that such is the case, and some inefficient empirical method of application frequently is employed. This sometimes is inconvenient, as in the case of prolonged storage periods.

Phosphate deposits have been applied to many deep drawing operations, usually in conjunction with a liquid lubricant, although in at least one application it has been reported that no other lubricant was used.

It may be mentioned that while the primary objective of lubrication is satisfied by the thick films of soaps, waxes, sulphide, rust and phosphate coatings, that is, the separation of surfaces so as to prevent welding, the last three treatments result in a high order of lubricant friction because of the necessity of deforming relatively brittle deposits.

15. **Metal Lubricants.** In certain severe drawing operations, especially those with ferrous metal, there frequently is interposed between the work and tool a layer of a dissimilar, ductile metal. Copper, lead, zinc, and tin have been used in this connection, application being by electrolytic means, hot dipping or chemical displacement. This type of lubrication has been discussed previously in this article. Nonferrous metals also are employed in powder form as fillers incorporated into water or oil base lubricants. Aluminum, copper, brass and lead have been used in this manner. It is, of course, necessary to have the metal in a very finely divided state.

REFERENCES

[54]Montgomery, H.: American Society for Steel Treating (ASM), 21-557, 1933.

[55]Reswick, M.: Transactions—ASST (ASM), 21-181, 1933.

[56]Spring, S.: To be published.

[57]Williams, R. C.: Journal Phys. Chemistry, 36-3108, 1932.

[58]Montgomery, H.: United States Patent No. 2,112,632, March, 1938.

[59]Francis, H.: Iron and Steel Inst., Carnegie Scholarship Memoirs, 21-1, 1932.

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CORRECTION

Unlubricated steel surface which was presented as Fig. 1 in first article of this series (See STEEL, Mar. 19, 1945, pps. 112-3) is taper-section of track formed by sliding a hemispherical copper rider over it. Horizontal magnification at 200 and vertical magnification at 2000 show adhering fragments of copper and pits marked H where steel was plucked from surface.—From "Ploughing and Adhesion of Metal Surfaces", Journal of Applied Physics, Feb. 1943, p. 80, by Bowden, Moore and Tabor.

Phosphate Coating Provides Parting Layer

A phosphate coating on ferrous rods and wire to interpose a tenacious, chemically developed parting layer between metal and die with added lubrication for the die has been developed by Oakite Products Inc., 22 Thames street, New York 6. Microscopic coating formed has a fine-grained crystalline structure which retains the usual die lubricants and carries them to point of deformation. Oakite CrysCoat process is said to result in increased production, uniform appearance of wire, and shorter downtime of equipment because dies last longer.

Material used is of an acidic nature, is supplied in powder form, and is soluble in water. It also is said to have detergent properties which remove light soils and much of the smut remaining on rods and wire after the pickling bath. Coating produced on ferrous rods and wire does not cause any appreciable dimensional or weight change. After treatment, physical appearance of rods or wire is only slightly different from that of clean pickled steel.

Clean rods or wire are immersed in hot solution contained in a welded black iron tank or wooden tank of adequate size. Concentration of solution ranges from 2 to 4 ounces of company's coating No. 86 to each gallon of water. Temperature of solution should be maintained at from 140 to 160 degrees Fahr. Closed steam coils for heating solution are recommended. The pH of the solution should be held within a prescribed range of from 5.0 to 5.7 as it has a definite bearing on size of the crystals formed. The pH may be determined with a LaMotte color comparator and restored to correct range by suitable additions of Oakite material.

Electrical Process Prevents Corrosion

Corrosion is prevented on the inner surface of a steel water-storage tank by a new automatic electrical method, providing constant protection at low operating cost. Installation was made at Cleveland Crane & Engineering Co., Cleveland, without draining tank or interrupting service. After method was used for more than a year, a check showed tank and piping to be in good condition. No rust or porosity was detected at any location of the inner surface.

Electrical method of preventing corrosion is based on maintenance of an electrical potential between steel water-storage tank shell and water in contact with the surface. Potential applied is opposite in direction and slightly in excess of electrolytic solution pressure of the metal. To insure excess of potential, an electric current is established through tank shell, water and properly located anodes in tank. Current is adjusted in amount sufficient to maintain ionized hydrogen film on inside surface of the tank. Film acts as an insulator, protecting the iron from contact with the water and action resulting in partial dissolution or corrosion.

Rectifier providing power is housed in a weatherproof steel enclosure. Potential is 24 volts and amount of current between anodes and tank is about 5 amperes. Anodes, with ¾-inch diameter, are made of special stainless steel.

This system is said to remove old rust and corrosion and to eliminate need for scraping and painting the inside wall. Periodic inspection of the power unit is made to insure continuity of protection and proper current flow.

Patterns Established for Swiss Files

Copies of Simplified Practice Recommendation R-206-44, Swiss Pattern Files, are now available from the Division of Simplified Practice, National Bureau of Standards. Recommendation establishes a list of 38 types of Swiss pattern files for stock production and simplifies the number of sizes and cuts in each. Width and thickness dimensions are given for some types, and dimensional tolerances are established. As names of most files are not descriptive, this recommendation includes a description of each type of file listed.

Copies of recommendation may be obtained from Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 5 cents each, with a discount of 25 per cent on orders of 100 or more.

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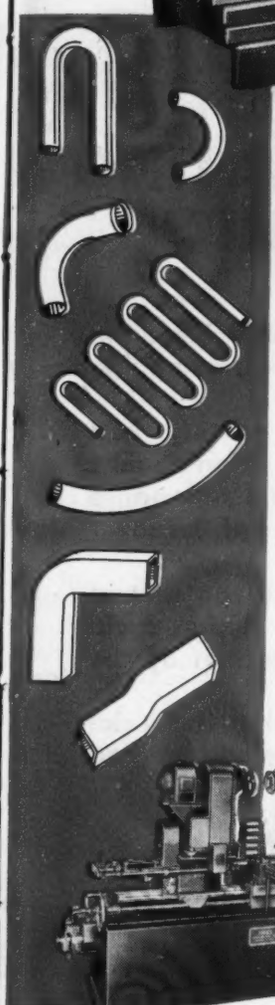

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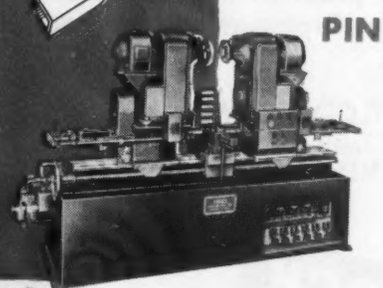

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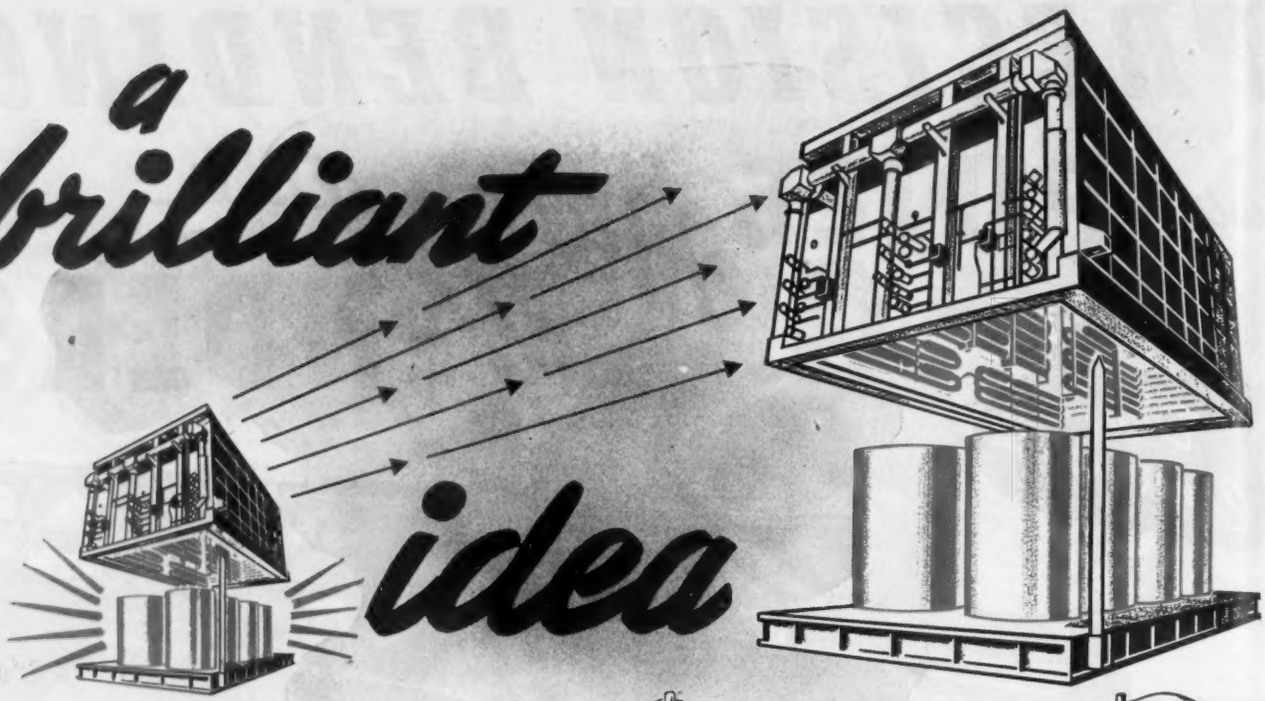

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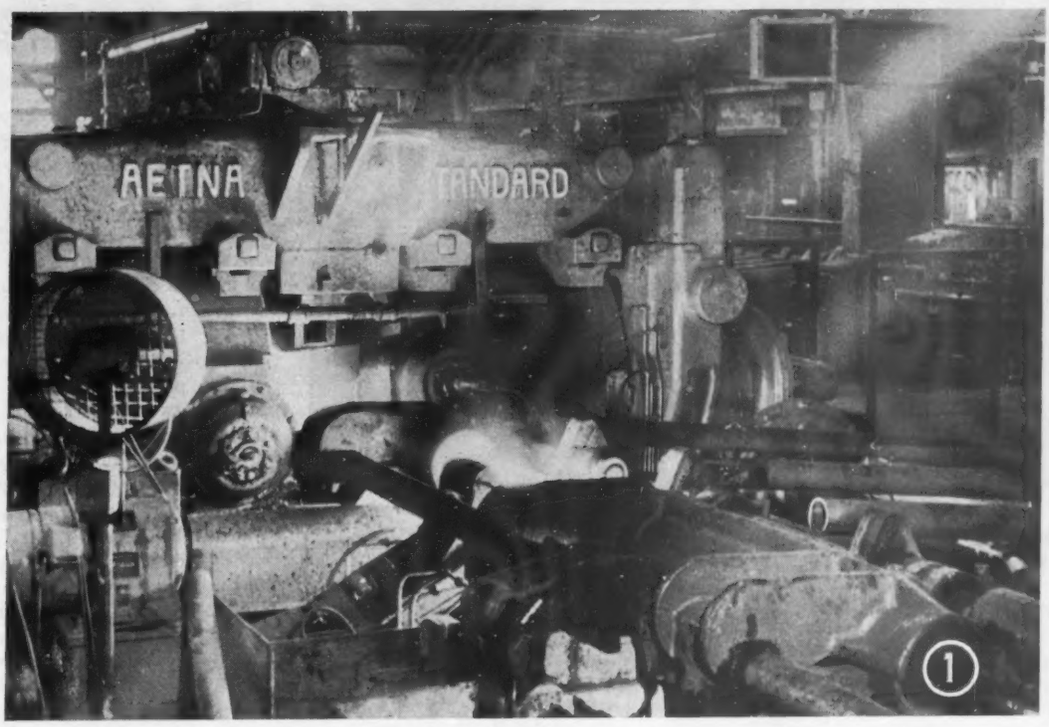

Fig. 1—Delivery end of piercing mill

Replace Seamless Tube Mill in Ten Weeks

Modern unit produces tubes 2⅞ to 7⅝ inches diameter. Large sizing mill is first of its size to be equipped with overhanging rolls and roller bearings. Cut-off machines built with four cropping units which operate in unison and crop four ends simultaneously. Tubes arrive in inspection department in minimum of time

UNLEASHING of some 30,000 horsepower of energy in its motors and furnaces sent the new ultra-modern seamless steel tube mill of the Pittsburgh Steel Co. into production recently at Allenport, Pa. The new mill replaces an older mill which had been in operation since February 1921. Installation of the new and larger mill on the site of the old mill, without interfering with production on the old mill presented special problems which were met by the engineering staffs. A part of the new mill was built literally on top of the old mill with the latter still in operation.

The new billet heating furnaces, billet cutting tables, charging conveyors and discharge mechanisms were completed several months ago. One Saturday night early in October, the evening shift completed its turn, piercing and rolling billets taken from the old furnace at midnight. Construction crews went to work, tore out the old system for conveying heated billets from the old furnace to the piercer, installed special temporary conveying system for transferring heated billets from the new furnaces to the old piercing mill and on Tuesday, about 60 hours later, the old mill was again in full operation with billets coming from the new heating furnaces.

Fig. 2—Tube on its way through plug mill

Immediately razing operations began on the old furnace, which was the site for the new piercing mill and its driving equipment, followed by the necessary excavating, building of concrete foundations, and installation of the new piercing mill, motor and driving-gear mechanisms. In this manner construction and installation of the new mill was carried forward with the old mill still in full production until Nov. 20, 1944 when its operation had to be abandoned to make way for further installation of the new mill.

In the short space of 10 weeks, units of the old mill, including the rolling mill, reelers, sizing mills, cooling table, and cut-off machines were removed, extensive excavating operations completed, forms built, foundations poured, and corresponding units of the new mill installed and readied for production.

The new mill, which weighs about four times as much as the replaced mill, is designed to roll tubes in sizes from 2⅞ to 7⅝ inches outside diameter in a wide range of wall thicknesses and lengths. Its design and layout permit straight line, high-speed production, and its oversize operating parts mounted in extra heavy antifriction bearings make

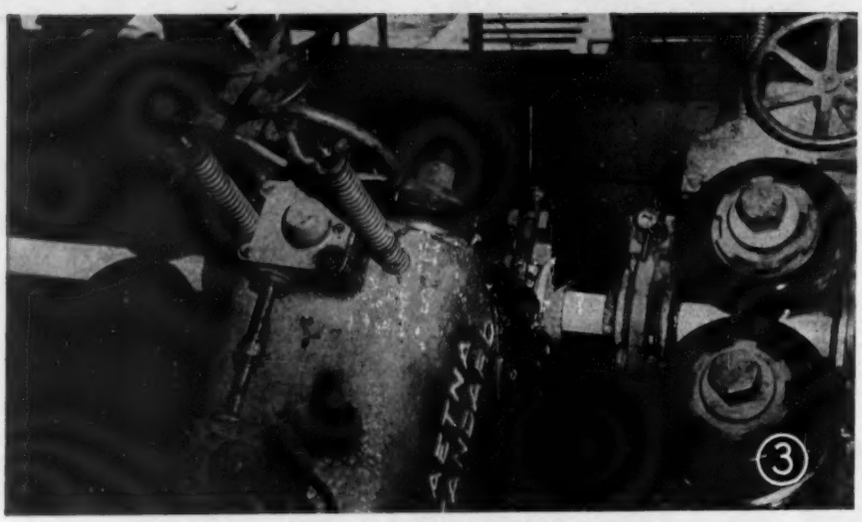

Fig. 3—Sizing mill equipped with overhanging rolls

possible the rolling of material to much more exact dimensions and also to handle many types of special alloy steels which are difficult to handle on older type mills.

The overall operation of the new seamless tube mill is to convert solid round steel billets or tube rounds into finished hot-rolled seamless steel tubes. Billets are produced at the company's steel plant at Monessen, Pa., and are delivered to the Allenport plant, a few miles up the Monongahela River, usually by river barge. In the billet yard at the Allenport plant, the billets are peeled by rotary cutters which take off sufficient stock to remove surface imperfections. Next the billets, which vary in diameter from 3 to 7 inches are cut to lengths of from 3 to 19 feet depending upon the amount of stock required for the dimensions of the finished tube, and pass by charging conveyor to the heating furnaces.

The billets, preparatory to piercing, are heated in two large furnaces. In the first furnace, where their temperature is raised to 1500 degrees Fahr., the billets rest on horizontal skids and are moved through the furnace by walking beams which lift all of the billets simultaneously, advance them from 6 to 12 inches at each "step", and return them to the skids. The length of travel at each step is adjusted in accordance with the size of the material and the heating time necessary.

The partially heated billets, leaving the first furnace, are automatically transferred to the second furnace where they are raised to the proper piercing temperature. In this higher temperature furnace, where it would be impractical to continue the walking beam mechanism, the hearth slopes downward toward the discharge end and the billets, while obtaining the higher temperature, are pushed forward down the sloping water-cooled skids.

The entire movement of the billets from the charging conveyor through both furnaces to the discharge trough is automatic, and timing of the cycle for all mechanisms controlled by a central control unit. At the same time a manual control enables the operator to make any modification in the cycle necessary in delivering heated billets to the piercer.

Following this heating operation which requires from 1½ to 3 hours, a ram discharges a billet to a runout table beside the piercer. On this runout table, the forward end of each billet is centered to facilitate concentric piercing. Centering is performed by an air hammer which punches a centering hole about 1-inch diameter and about 1½ inches deep.

The properly heated billet promptly enters the piercer where the billet is pierced by the process known as Mannesman roll piercing, which employs both diagonal rolling and piercing. A 4000 horsepower motor operates this piercing unit and several speeds are available from the selection of motor speeds and gear-box gears. The large motor has a completely enclosed air-cooling system.

Upon leaving the piercing mill the tube moves directly to the tube rolling mill or plug mill where in repeated passes between the grooved rolls and over successive mandrels, its wall thickness and diameters are reduced, and the tube is proportionately lengthened.

After completing the plugging operation the tube passes alternately to the two reelers where it undergoes the next finishing operation of reeling. Here the tube, still hot, is forced between two swiftly revolving rolls and over a mandrel plug held in the tube between the rolls, the rolls being slightly inclined to give forward motion to the tube. The reeling operation makes the tube round practically straight, and gives it a burnished surface.

From the reelers the tube passes through a 5-stand sizing mill which completes the rolling operation by reducing the diameter of the tubes to the desired finished dimensions. This is the

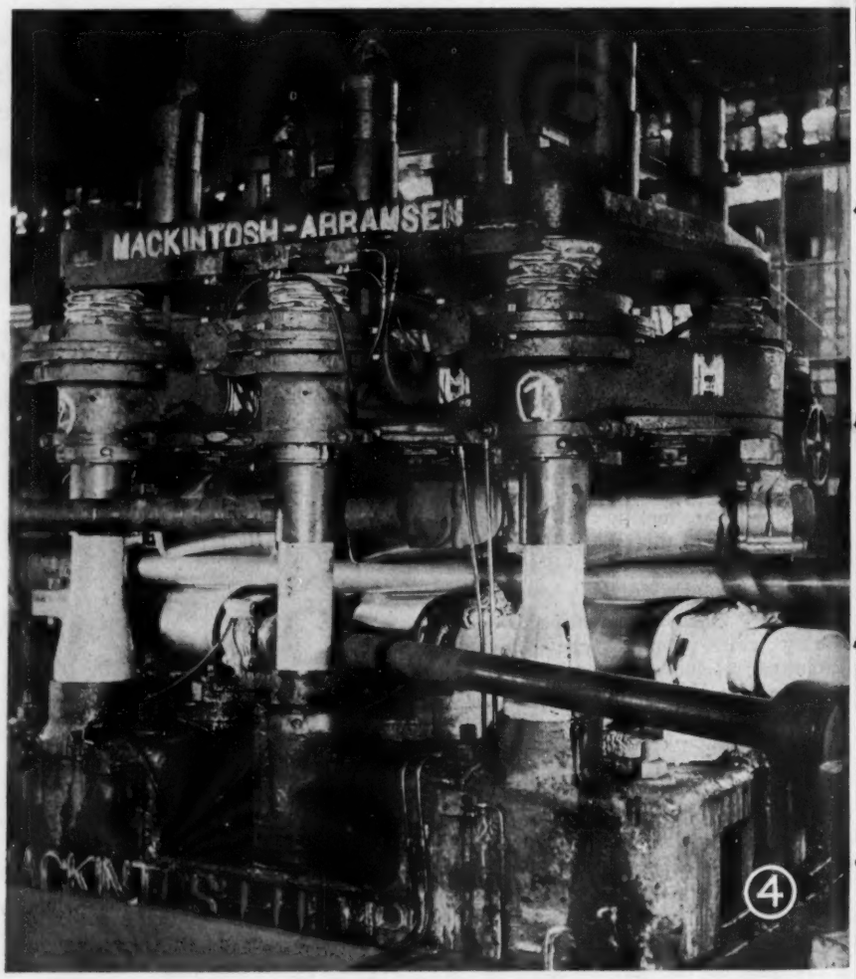

Fig. 4—Straightener of the cross-roll type

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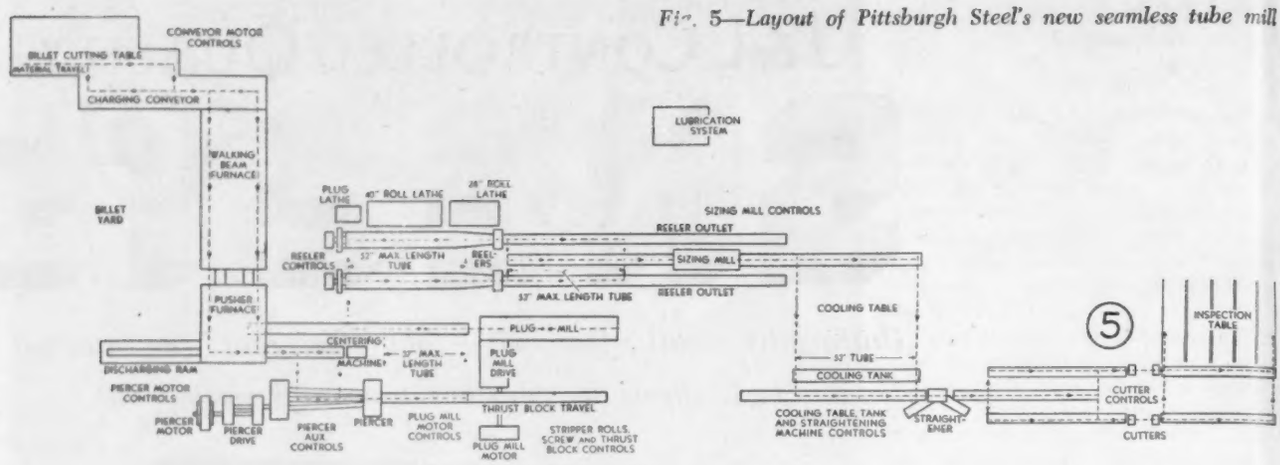
Fig. 5—Layout of Pittsburgh Steel's new seamless tube mill



first large-size tube sizing mill built with overhanging rolls and also with roller bearings. The long, oversize roll shafts operating in roller bearings result in a new standard of accuracy. Moreover the equipment is of special design which permits changing of rolls without disturbing the bearings.

Tubes now, with the hot rolling operations completed, pass to the cooling table where their temperature is permitted to drop below the critical point, and as they leave the rear end of the cooling table they drop into a cooling tank. From this tank the tubes pass through a modern design 6-roll straightening machine, in which guides are eliminated, where the tubes are straightened for their full length.

From the straightener the tubes move to the cut-off machines where the crop ends are removed. These cut-off machines, with four cropping units, have features of design and operation developed largely by engineers of the Pittsburgh Steel Co. The tube is held stationary and the cutting head rotates. The four cutting heads actually are mounted in tandem pairs in one large compact unit. The forward end of the tube enters the first cutting head of a pair, this end is cropped, the cutters retract and the tube passes on through the first cutting head and through the second cutting head in the pair up to the position where the rear end of that tube is to be cropped. With the compact arrangement of the four cutting heads and with the controls all centrally located the four units are operated in unison, cropping four ends almost simultaneously in one-two-three-four sequence. From the cut-off machines the tubes pass directly to the inspection tables for final inspection. They are then ready for shipment as hot finished tubes, or if required go to the cold-draw, specialty or other departments for further operations.

A central circulating oil system is used to lubricate the main driving mechanisms of the entire mill. All returning oil is cleaned as it passes through the central unit, and the oil is heated as required according to weather conditions.

Another feature of the design and operation of this new mill is the speed with which the tubes reach inspection. This operates as a continuous and early check on all production line operations. If at any time inspection standards are not being met, the departure can be corrected promptly, with minimum number of improperly made tubes on the line.

At present, all production of this new tube mill is being supplied on priorities for highly essential war needs. Later when these requirements are reduced, the mill will be used for the manufacture of seamless steel tubes in a wide range of sizes in many carbon, alloy and stainless analyses and in close tolerances on special specifications.

Machine Lubrication

(*Continued from Page* 113)

duction facilities, any delay can be extremely costly in lost output. Thus the positive lubrication afforded by the centralized system is important.

Metering valves at each point lubricated have a tell-tale device that indicates positively whether or not the unit is operating properly. In addition, Mr. Jennings explains that Farval systems are controlled by pressure built up through the entire line, thus any faulty operation is immediately indicated at the pump. This arrangement will be made evident in the description of the system further on.

Bearings on many machines are not easily accessible, thus may easily fail to receive proper lubrication with resulting failure. Users of centralized systems find the elimination of such failures an exceptionally important advantage. It can mean a great reduction in maintenance expense.

For example, on a continuous strip mill, one man on each turn was kept busy repairing gear reducers on the runout table drive—replacing bearings, gears, etc. Lubricant in the table roll bearings was carbonizing under the heat, causing them to stick and imposing a tremendous load on the gear drives.

An automatic centralized system now pushes old grease out and replaces it with fresh grease at 10-minute intervals, using an automatic timer. Table roll bearings turn over easily at all times with the result that not a single gear reducer has been taken out for repair since the system was installed many months ago.

Continuity of service is more important than cost savings, in many pieces of equipment. Yet a centralized lubricating system for the average plain bearing roll neck installation will pay a yearly return on the investment of approximately 600 per cent, reports Mr. Jennings. Add to this cuts in power consumed running from 5 to 30 per cent, savings in lubricant up to 90 per cent with increased machine output and it is not difficult to see why centralized lubrication systems are being recommended as one of the surest ways to reduce production costs.

Wide Range of Application: Mr. Jennings points out that Farval systems handle an extremely wide range of applications. Where the service is fairly light and lubrication once or twice per shift is sufficient, the manual systems are most economical. But where heavy service requirements demand lubrication at frequent intervals (such as on steel mill rolls, runout tables and the like) the automatic type of system is most satisfactory, since electric timers will operate the system regularly at the correct interval to provide the continual lubrication necessary.

Farval System: The Farval system consists of a pumping unit located at floor level or other safe point and connected to a measuring valve at each point to be lubricated by two main supply lines which do not need to form a complete circuit back to the pump. In operation, lubricant under high pressure is forced through one of the lines, supplying a measured amount of lubricant to the bearings from each metering valve. Operation of the measuring valve serving each bearing is explained graphically in Figs. 1-6.

This valve has a number of important features: First, it contains no springs, no check valves, no small ports—thus its reliability is extremely high, proper

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functioning being assured; second, it measures by piston displacement, its action being extremely accurate as these pistons are made to tolerances of 2/10,000-inch and are selectively fitted; third, amount of lubricant is adjustable throughout a wide range so can be set to supply just the exact amount required by the bearing; fourth, the indicator shows operation at each bearing.

Use of two lines with hydraulic pressure as the operating medium permits the extremely simple construction of the metering valve which features only two moving parts.

Up To 3000 Bearings: There are five sizes of metering valves for different service requirements. Valves are grouped in blocks containing up to four valve assemblies. Mr. Jennings informs us that as many as 3000 bearings can be served by a single system, the total developed length of the line being the only limiting factor, for as soon as one bearing is serviced, the full line pressure is available to operate the next valve.

Depending upon the consistency of the lubricant, greases can be pumped up to 500 feet and oils much further, of course. Maximum length of line also depends upon the working temperature, pipe line diameter and rate of flow.

Manual System: For most ordinary applications, the centralized system with a manual pump is entirely adequate and therefore most often used. Where the points to be lubricated are readily accessible, a centralized system will prove practical from a cost standpoint if there are 12 or more points requiring service at regular intervals.

Where the bearings are not easily accessible, the centralized system may be a paying proposition even if there are only four or five points to be served. The manual system is recommended for above applications where lubrication requirements can be satisfied by intervals up to 4 hours with grease, 2 with oil.

It only takes 15-20 strokes of the pump to service 50-75 bearings and this can be done in less than a minute. On large presses and other equipment, the machine operator can lubricate his unit while it is coming up to speed.

Typical applications for this type of system are on large machine tools, such as boring mills, planers and the like.

Automatic Power-Driven Systems: Where machine speeds are high, where heavy loads occur, or where high ambient temperatures exist, more frequent application of lubricant becomes necessary and it then is desirable to go to some form of automatic system which will apply the lubricant at regular intervals without attention.

Such a system can be designed to service points requiring lubrication every minute. Many operate at intervals of 2-3 minutes, although perhaps the average interval for automatic systems is 10-15 minutes.

Typical applications for automatic systems are on mill stands rolling steel, brass or rubber where bearings are lubricated every 8-10 minutes on an average; on big jaw type crushers in mining and working ore, where lubrication is supplied every 3-4 minutes; on automatic forging machines and upsetters; on other bearings which operate at speeds under 200 r.p.m. and carry heavy loads.

Automatic systems also are suitable for high speed stamping presses, for triplex pumps and similar units.

Too, where high ambient temperatures require frequent renewal of the lubricant, automatic systems are preferred. Such applications include lubrication of roller hearth furnaces, runout tables, plate levelers and the like.

Grease vs. Oil: As previously mentioned, either grease or oil can be handled . . . but not both at the same time. Where lubrication of the machine requires both oil and grease, it generally is possible to find a heavy bodied oil or a light grease that will do the job well for both types of service.

IMPROVISED GROOVING TOOLS

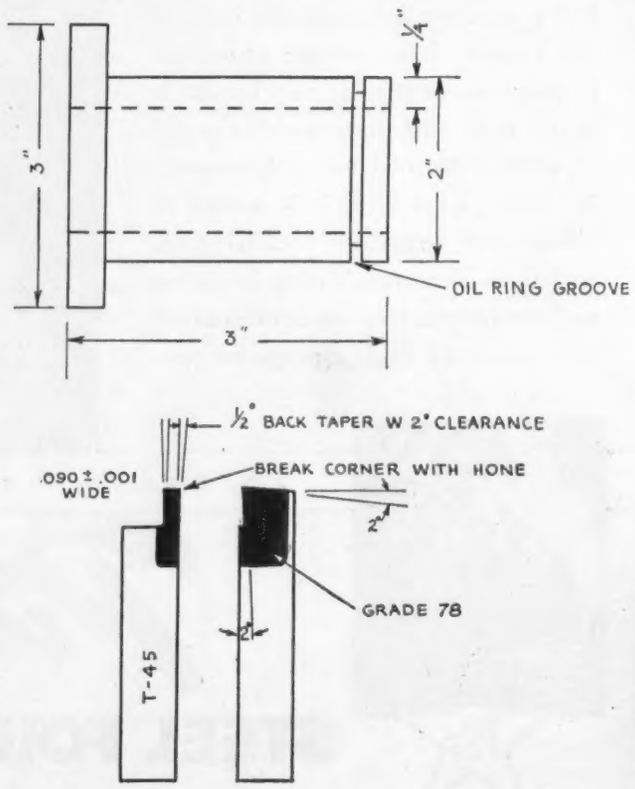
Inexpensive, accurate implement gives greater production between grinds, reduces rejections and improves finish on bushings

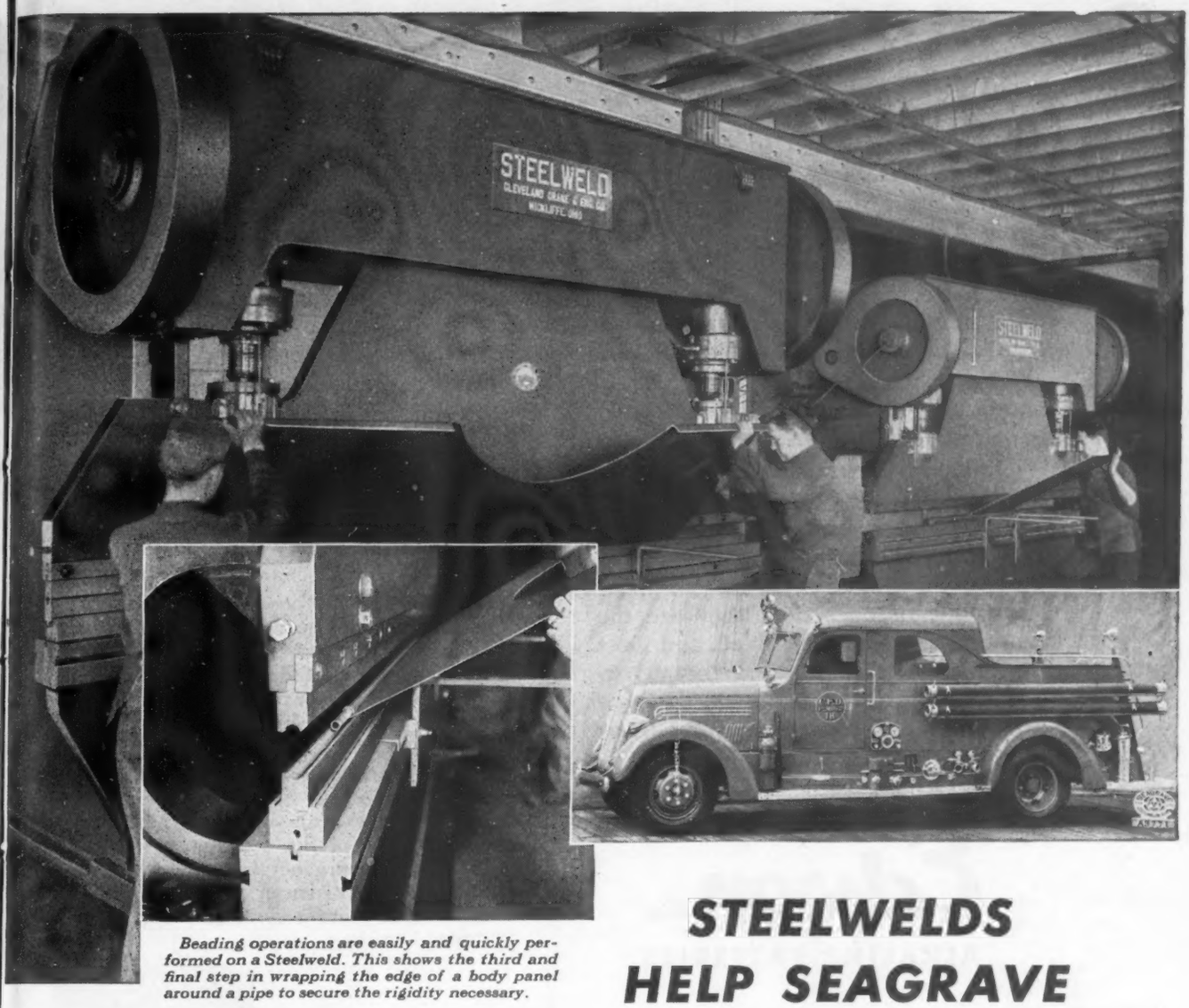
INEXPENSIVE method of overcoming tool troubles encountered while machining grooves in steel bushings has evolved from the simple expedient of converting a standard right-hand carbide-tipped turning tool with a straight tip into a precision grooving tool.

The job consisted of grooving a bushing made of SAE-4140 bar stock having a brinell hardness of 290-310 (see accompanying illustration). The groove was 0.160-inch deep and 0.090-inch wide, plus or minus 0.001-inch. Originally the groove was machined with a high-speed steel tool which gave from 10 to 12 pieces between grinds. Rejections were high because of the rough finish produced by the high-speed steel tool, and production was low.

A standard right-hand turning tool with a straight tip made of grade 78 Carboloy cemented carbide, which has high resistance to wear, was ground as shown. The tool then was rotated 90 degrees and the steel cut out. The result was an inexpensive grooving tool which combined high precision with an even greater degree of strength than is possessed by the usual type of carbide grooving tool due to the increase in braze area.

With this improvised grooving tool, a cutting speed of 350 surface feet per minute was maintained with an 0.003-inch feed. The number of pieces obtained between grinds rose to 125. The finish obtained approached that of a ground surface, thereby eliminating rejections due to poor finish.





Beading operations are easily and quickly performed on a Steelweld. This shows the third and final step in wrapping the edge of a body panel around a pipe to secure the rigidity necessary.

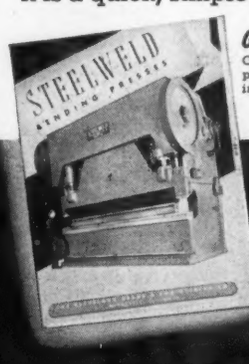
STEELWELDS HELP SEAGRAVE BUILD MODERN FIRE APPARATUS

Body panels, hoods, fender aprons, dashes, running boards, gas tanks, and other parts for the pumpers, ladder trucks and fire-fighting equipment made by The Seagrave Corporation, Columbus, Ohio, are fabricated on their two Steelweld Bending Presses.

These parts requiring bending, forming, louvering, beading, punching and notching, are formed a few at the time in production runs as the demand requires. It is easy to switch from one operation to another because it is a quick, simple matter to change the dies.

The satisfactory performance of the first press, a model I-10 installed in 1936, led to the purchase of a second machine in 1941, a model F3-8. The older press handles plate up to $\frac{1}{4}$-inch by 13 feet and the newer machine up to $\frac{3}{16}$-inch by 11 feet.

By replacing sharp welded or riveted corners wherever possible by quickly made, smooth, round, bended ones, the Steelwelds are proving an important factor in providing the modern, sleek appearance characteristic of Seagrave fire apparatus.



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CHARGE ONE WHILE THE OTHER WORKS

Thousands of battery industrial trucks are working 24 hours a day handling materials in war plants. As a rule, one battery operates a truck for 8 to 12 hours, then is exchanged for another that has been charged meantime. Thus, except for the two or three minutes needed to exchange batteries, the truck need not stop work for servicing of its power unit.

A battery industrial truck has electric-motor drive, which means quiet operation, freedom from vibration and fumes, and a minimum of wearing parts. It starts instantly yet consumes no power during stops. It uses low-cost electric power. Altogether, it is one of the most dependable and economical types of handling equipment, especially in 24-hour-a-day operation.

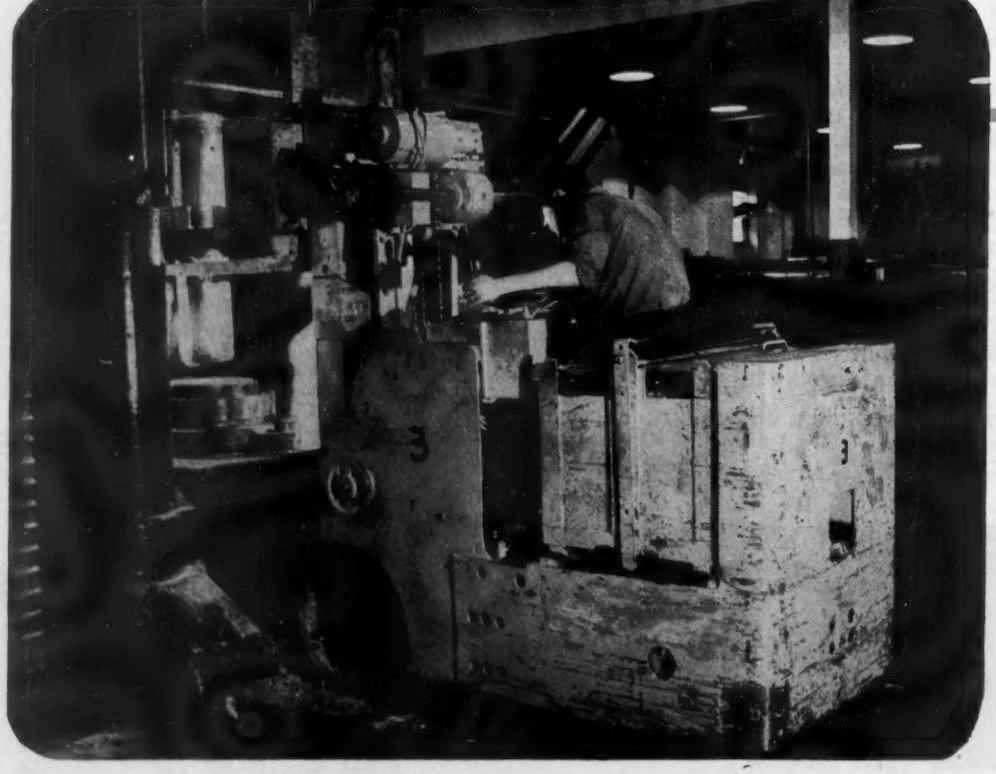
It is extra dependable and extra economical when powered by Edison Alkaline batteries. With steel cell construction, a solution that is a natural preservative of steel, and a fool-proof principle of operation, they are the most durable, longest lived, and most trouble-free of all types of storage batteries. *Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey.*

Edison
ALKALINE BATTERIES

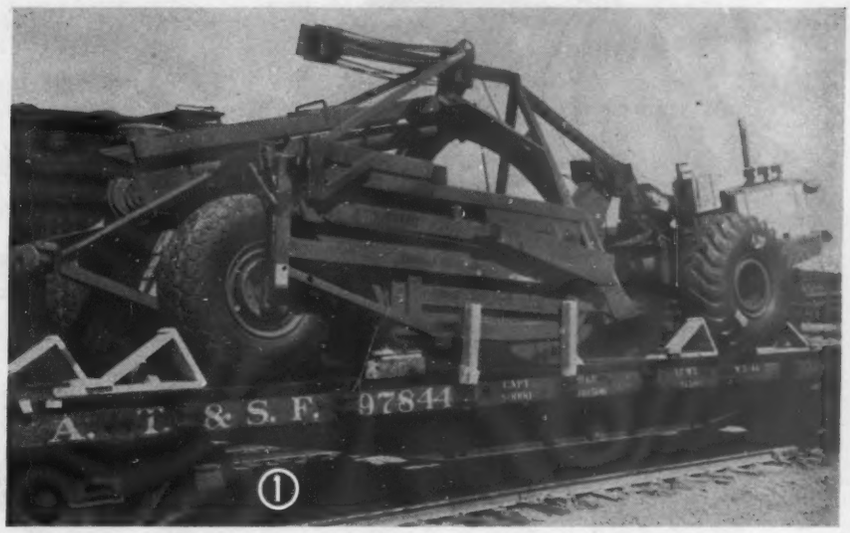
GETS FOUR "NEW" BATTERIES FREE
A Typical Illustration of Alkaline Battery Dependability

The electrician of an industrial plant needed a standby power battery. Instead of buying one, he assembled one from cells of industrial-truck batteries that were being replaced. Their capacity, no longer sufficient for truck duty, was ample for the relatively light demands of the standby job.

That was around the start of the war. The "new" battery was so satisfactory that he has since made up others; he now has four supplying standby power for auto calls, emergency lights, clocks, etc., all from cells of batteries that had delivered eight years' service or more in industrial trucks.



Changing the punch on the ram of a press is a job that is being simplified by the use of the fork-lift type of truck in the manner illustrated here. Articles describing new developments in handling methods appear regularly in our publication, STORAGE BATTERY POWER. Write for a sample copy if you do not already receive it.



①

Processing and Packaging

Heavy Equipment and Spare Parts

Need for better protection from corrosive elements and effects of rough handling during war brings revolutionary changes in materials and procedures for preservation and preparation of parts to be shipped and stored. Packaging developments demonstrate that it is possible for parts so treated to retain full serviceability in nearly all parts of the world and under all conditions

By WALTER J. BROOKING

Director of Testing and Research
R. G. LeTourneau Inc.
Peoria, Ill.

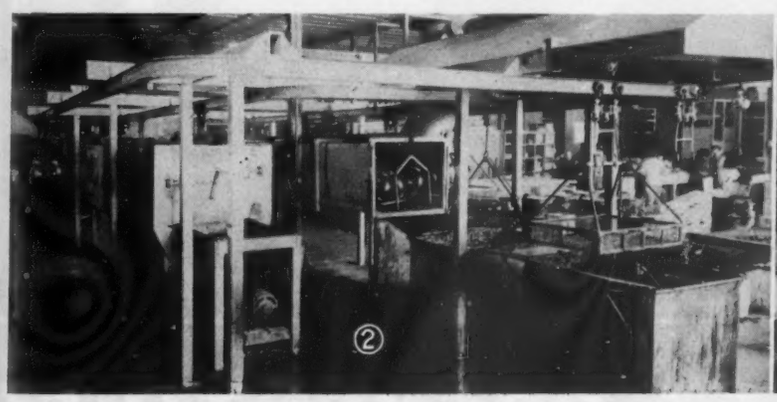
PROCESSING of equipment and spare parts for storage, warehousing, or shipment, with special attention to resistance to corrosion under adverse conditions in service, has been tremendously affected by the war. Need for better protection of parts from corrosive elements and from the effect of rough and hurried handling under widely varying conditions of weather, temperature, handling facilities, and warehousing has brought about almost revolutionary changes in the materials and methods used for preservation and preparation for shipment.

Effect of these changes has been keenly felt, especially by those whose regular peacetime products were being used without fundamental modifications for military use, such as the heavy grading and earthmoving equipment produced by R. G. LeTourneau Inc., Peoria, Ill.

With the outbreak of war, production of this organization was immediately diverted almost 100 per cent to activities both on the battle fronts and in construction in all parts of the world. Present status of equipment and spare parts processing for storage, handling, and shipment is that of a well-developed, well-equipped and well-organized set of operations which have become a regular part of company production. Shipments of the company now amount to over a million dollars worth of spare parts and several million dollars worth of finished equipment each month.

The fact that equipment and parts are being supplied to different governmental agencies, including Army Engineers, Marine Corps, Air Corps and Navy, does not make a tremendous difference in the processing because the fundamental requirements are much the same for shipment and storage for all of these agencies. Procedures, while varying in minor detail, are standardized within broad limits.

Operations of today indicate considerable development and organizational improvement over the past 2 years, much of it being predicated upon two important factors: First, volume of parts and finished equipment (especially spare parts) which were to be processed; and second, the development of new products for processing with superior physical and chemical characteristics for the pres-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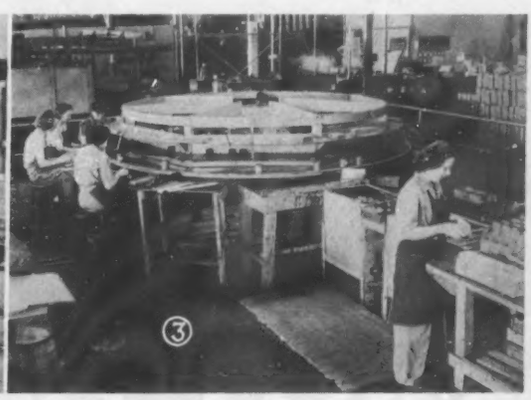
③

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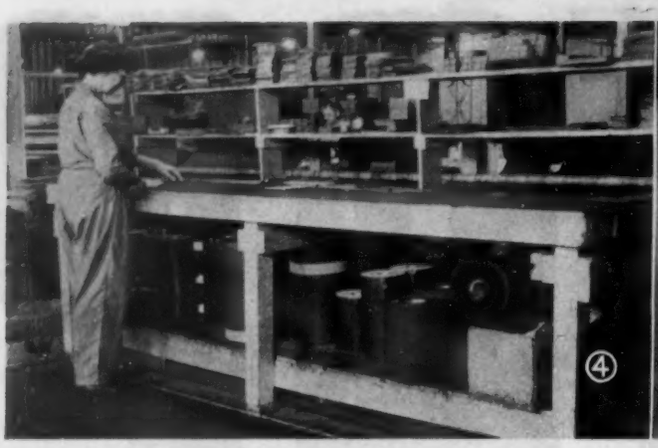
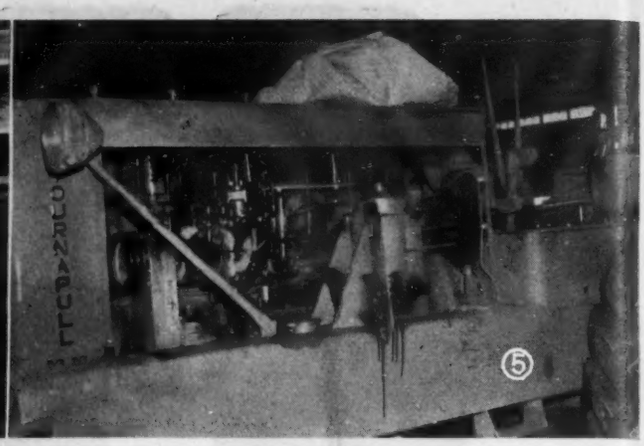
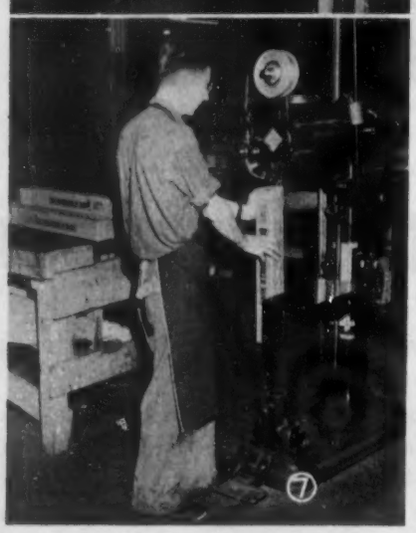






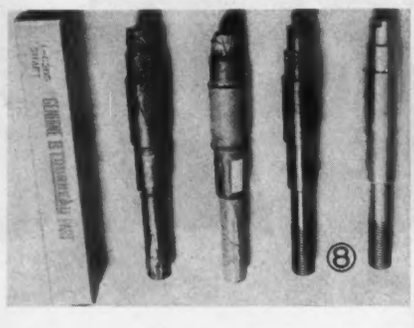
ervation of parts from corrosion, and for their protection from the effects of handling and shipment under adverse conditions.

Military operations require the procurement of a very much larger number of sets of spare parts than ordinary civilian use because of the greater probability of loss in time of war. Volume of parts to be processed justified the installation of equipment, procuring of special materials, and the organization of procedures and departments along different lines from those required for normal, peacetime packaging. The fact it became a mass production operation, coupled with the urgent need for material to arrive on the battle front in perfectly usable condition, brought about a considerable development within a relatively short time. This development is described in following paragraphs.

Processing Equipment: With requirements previously mentioned, there arose a need for the development of processing facilities with more capacity. The desirability of making these facilities as highly mechanized as practical was accentuated by shortage of manpower. It also was necessary to concentrate as much of the packaging and processing equipment and operations into as small a space as possible to avoid having to build more factory space.

As type of equipment installed was based primarily on properties and characteristics of materials to be used, selection of both processing procedures and equipment was influenced by the probability that certain of the processing operations undertaken for military needs would remain practical and desirable after the war, especially for export shipments.

Many parts, and the bulk of finished equipment could be preserved from rust by the ordinary method of cleaning followed by painting, using prescribed government specification of paint for the main protective covering, with only a small amount of special localized processing of moving parts or machined surfaces. Boxing and crating of parts and equipment represented a problem largely

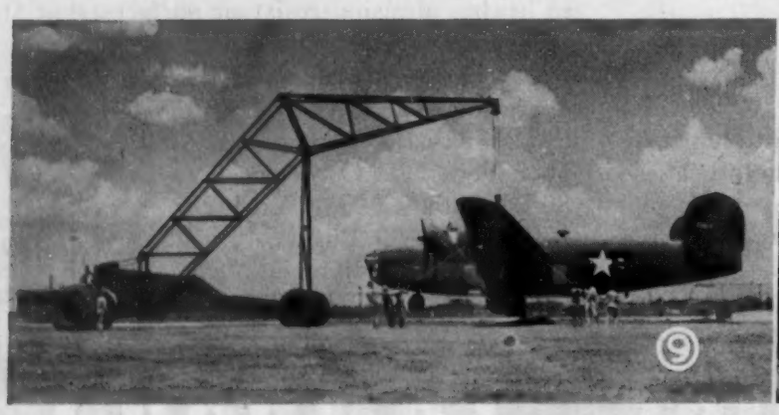


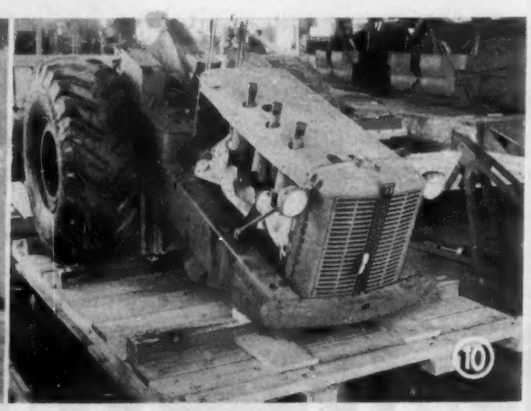
of volume, rather than a fundamental difference in processing for military operations. Therefore, little special equipment or materials, aside from more lumber, saws, and carpenters, was required.

Greatest problem encountered was that of preservation of the large volume of machined parts, the surfaces of which could not be painted, yet which required full protection from corrosion as well as good mechanical protection for storage, handling, and shipment.

Preparation for mobile military ship-

(*Please turn to Page* 156)





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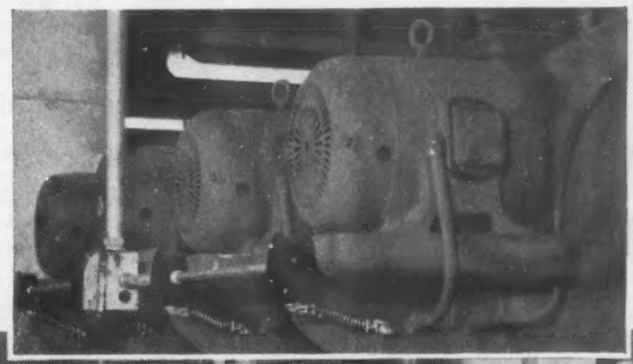

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The inner frame of Century TEFC Motors is sealed against the entrance of foreign matters. The windings and bearings are thus protected—and longer, more continuous operation is assured in destructive atmospheres.

The motor is kept cool by a fan, which forces air through large, smooth air passages between the inner and outer frames. These modern Century motors meet the demands of high-speed production that exists today and will continue after the war.

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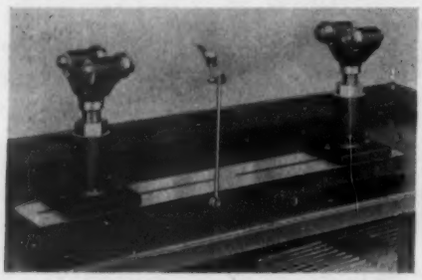
Aligning Fixture

Designed to check the alignment of crankshafts on aircraft engines not designed with the internal spline feature and for checking alignment of aircraft propeller shafts and assembled aircraft engine crankshafts, a new AMSCO model PA 156-B crankshaft aligning fixture

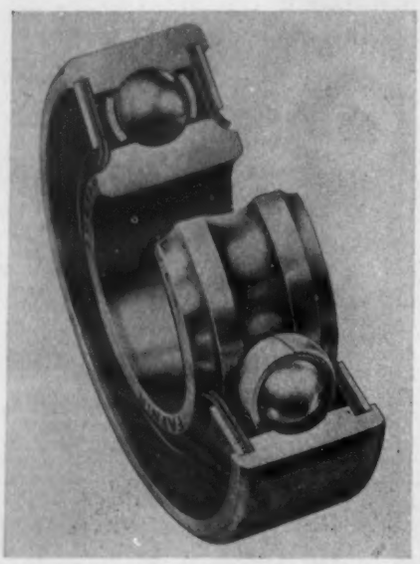


is announced by Airplane Mfg. & Supply Corp., 6853 Lankershim boulevard, North Hollywood, Calif.

It is a precision instrument with every component part closely fitted and assembled for consistent accuracy in testing. The crankshaft in the fixture is always free to rotate for concentricity checking. The unit is 36 inches long, 6 inches wide and 13 inches to top of bearing mounted V-blocks.

Sealed Ball Bearing

Known as Plya-Seal, a new type of sealed ball bearing is offered by Fafnir Bearing Co., New Britain, Conn. The sealing element consists of a diaphragm-

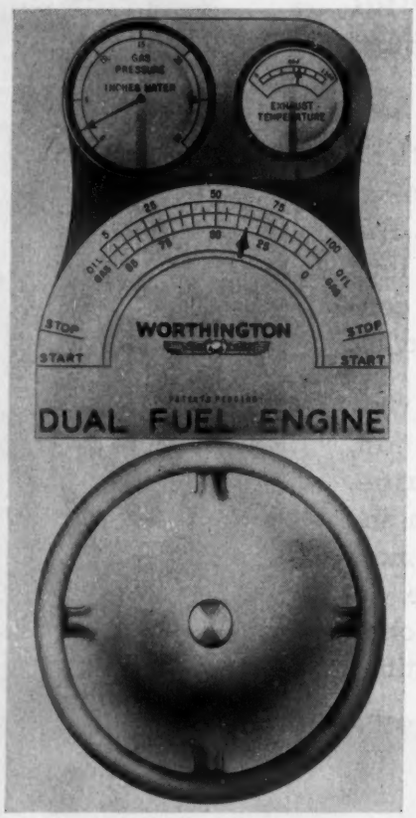


type, contact seal comprising two members—a flat, flexible sealing washer of synthetic rubber impregnated fabric and a split retaining ring of spring steel. Due to the minimum space required for the two seal parts, the bearings, except in the extra small sizes, are held to the same widths as standard unsealed bearings.

Firmly held in the outer ring, the sealing washer does not rotate with the inner ring but is in contact with a ground groove to form an effective seal with a minimum of friction. The bearing can be removed and replaced to allow inspection, washing and regreasing. It causes no distortion of the outer ring or race and does not effect the concentric relationship of the inner and outer bearing rings. Seal is noncapillary and impervious to grease, oil, gasoline, water and a variety of solvents.

Dual Fuel Engine

An engine capable of instantaneous conversion from oil to gas fuel without change in load or speed has been developed by Buffalo Works of the Worthington Pump & Machinery Corp. Conver-



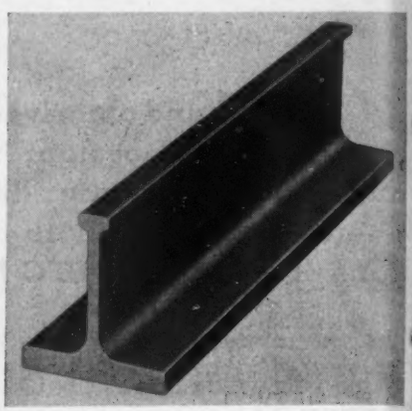
sion from one fuel to the other or adjustment of a combination of both is accomplished by one revolution of a single control wheel.

The dual fuel engine can burn either gas or oil or both together. Regardless of the fuel being used, the engine operates on an efficient diesel cycle. It does not require a high pressure fuel gas supply of the engine. A pressure of 2 inches of water is used. When operating a gas engine, pilot oil ignition is used, eliminating electric ignition. Pilot fuel can be used in amounts as low as 5 per cent of the total full load B.t.u. requirements of the engine.

This system is produced by the company to cover the entire range of its diesel sizes. It is suited for use in sewage plants, oil fields, industrial and municipal plants, gas utilities and refinery services.

Tramrail System

For moving and handling of raw stock, parts in process and finished products, a new tramrail system has been developed for mass production industries by Forker Corp., 1825 East Forty-seventh

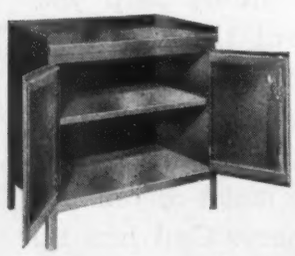


street, Cleveland 3. It consists of several one-piece rolled steel tramrail sections, suitable for various span and load conditions. The T-rail section is shown in the accompanying illustration. Trollies are available for both chain and electric hoists. Also included are monorail switches, monorail cranes, and below-the-hook devices. A new feature is "shielded electrification", a safe means of getting power to trollies and cranes, with live conductor bars covered against contact by workmen.

Cabinet-Bench

A machine tool cabinet-bench offered by Lyon Metal Products Inc., Aurora, Ill., has a heavy steel top which makes a sturdy mounting for small grinders and vises. The bottom shelf and adjustable center shelf provide 12 square feet of storage space.

This cabinet-bench is available in two



models: No. 2345-11 which is 36 inches wide, 24 inches deep and 34 inches high, bottom shelf 7½ inches above the floor; No. 2345-12 is the same cabinet with built-in flat key lock. The handle is cadmium plated and includes a padlock attachment. The cabinet is finished in green baked enamel.

(All claims are those of the manufacturer of the equipment being described.)

Umbrellas are not always for weather protection. To the Navy the "umbrella" is the protecting layer of five-inch anti-aircraft gun fire during enemy attacks, an "umbrella" that keeps heavy bombers high and ineffective.

Bases, carriages and slides for these remarkably accurate Navy guns, welded and machined at Danly, are mounted on Navy ships throughout the world . . . important proof of the value of precision welded steel fabrication.

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THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Flash Welding

(*Continued from Page* 105)

the steel is clean and that the dimensions do not vary from piece to piece and also that there is no slippage in the dies or variation in welding voltage. The uniformity of operation of the welder is also of great importance.

If any of these are present, bottoming the cylinder is likely to result in faulty welds when welding a critical steel like chrome-moly. Not bottoming the cylinder will tend to offset these to a certain extent but with a variation in upset distance. One of two compromises must be made if all conditions are not to be held constant; either the quality of the weld must be sacrificed or the amount of take up must suffer some variation.

Upset Pressure: If the cylinder is going to be bottomed, then the upset pressure is of no influence on the weld so long as it is sufficient to insure bottoming the cylinder.

If the cylinder is not going to be bottomed, then the upset pressure is of major importance. Although upset pressure is commonly considered as a function of the cross sectional area, it is also really a function of the compactness of the weld area. For example, take the two extreme cases. The one of a solid round section and the other of a tubular section of very large diameter with exceedingly small wall thickness. Even though both of these have equal cross-sectional area, it would be foolish to use the same upset pressure and expect similar welds.

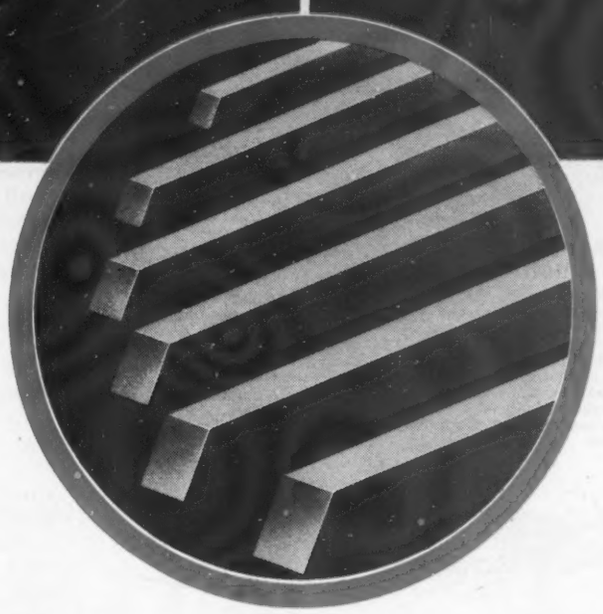
To determine the unit upset pressure in pounds per square inch of the weld area, two things must be taken into account. First, the type of steel being welded and second, the difficulty of extruding the molten metal from the weld. Unfortunately, very little is known about just what is the desirable pressure for various types of sections. This much can be stated. If excessive pressure is used, the effect upon the weld is to cause excessive brittleness and low impact strength along with probably incomplete fusion but with quite high tensile strength.

There are two ways in which brittleness may be caused in the welding of 4130 and other alloy steels. The first is due to the fast cooling of weld by the chilling action of the dies, producing in effect a quenching action on the steel not unlike actual heat treatment. Since most of these steels are air hardening, the result is brittleness in the weld zone.

The second cause of brittleness is less obvious and is open to some argument. If a material is considered ductile it means that it will elongate before rupture. This elongation is obtained because of the ability of the grains in the steel to slip along each other. These grains can only slip so far until rupture is the result. If after upset in a flash weld there is excessive pressure when cooling below the plastic temperature

In the making

Illustrating how ALX Cast Alloy Tool Bits are poured on a centrifugal spinner. The metal is weighed first to assure filling the mold without insufficiency or waste.



On the job

A 7/16" ALX Tool Bit rough-turning a Type 309 (25-12) stainless steel forging of 4-1/4" diameter, taking a 1/8" cut at a speed of 140 feet per minute, with a feed of .020".

Announcing ALX CAST ALLOY TOOL BITS — FAST CUTTING NON FERROUS TOOL BITS CONTAINING BORON

OUR most recent development in the field of cutting materials, ALX Cast Alloy Tool Bits, is the result of complete and thorough research investigation in the Allegheny Ludlum Laboratories, and exhaustive machining tests in the field.

Produced by advanced methods of centrifugal casting, ALX Alloy is a highly homogenous metal, with consequent advantage in cutting properties. It possesses high hardness in the as-cast condition, requiring no further heat treatment. In performance, ALX rates between carbide metal-tipped tools and high speed steel. It rounds out and completes the Allegheny Ludlum line of cutting materials—which includes Carmet carbide metals and a wide selection of high and low-tungsten and "moly" high speed steels—giving us the utmost range in supplying the tools best fitted for each individual job.

Ground and finished ALX Cast Alloy Tools, both in solid and tipped bits, are available in a complete range of sizes from our own and distributors' warehouse stocks. They fully merit serious investigation and comparative testing on your cutting jobs. The assistance of our Mill Service Staff is at your entire disposal • Also available is a new and complete bulletin on ALX Tool Bits, giving full data on selection and performance. *Write for your copy.*

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STEEL CORPORATION
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This man can help you gear your plant for post-war

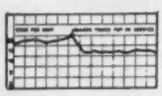
The Baker Material Handling Engineer is at your service to help you meet postwar demands for lower production costs, increased plant capacity and improved working conditions. His intimate knowledge of inside transportation problems—in plant, warehouse, shipping or receiving platforms—enables him to evaluate your complete handling set-up and recommend the proper equipment to achieve objectives listed below, for present or post-war needs.

INCREASED PLANT CAPACITY

Baker trucks can help you multiply the value of plant floor space by tiering material two or three high (or higher), by storing bulky dies or other material in yards or remote areas, by keeping materials moving and machines running for most efficient production.

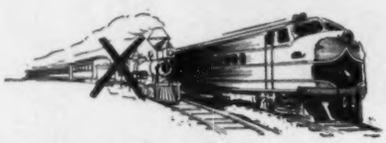
GREATER MANPOWER EFFICIENCY

Handling materials faster, handling bigger loads, using one man (or woman) with a power truck to do the work of 6 or 8 with hand trucks, getting more out of skilled labor by cutting idle machine time—these are a few of the ways in which Baker Trucks can improve manpower efficiency.



LOWER PRODUCTION COSTS

Since handling of material is not strictly a production operation, it offers one of the best possibilities for savings in overhead cost. Rent costs, machine and labor costs, loading (and unloading) costs, spoilage costs, accident costs—all can be cut by proper use of Baker Trucks.



FASTER DELIVERIES

Streamlining production and movement of material with Baker Trucks can move up delivery dates, shipping and receiving in "unit packages" on skids or pallets means less damage in transit. Faster loading and unloading and better warehouse handling are also important factors.

IMPROVED PLANT SAFETY

Material Handling accidents account for approximately 5 million working days lost annually—about ¼ of the total. Eliminating the handling of heavy objects, overloading hand trucks, improper stacking, and overhead dangers by the use of Baker Trucks, can go far toward reducing this waste.

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Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

Baker INDUSTRIAL TRUCKS

of the metal, the net result is to make the grains slip as much as they are able. Therefore, due to this cold working, the weld is more brittle than it might have been.

According to the R.W.M.A. manual, welds made with insufficient pressure are characterized by porosity, inclusion, low strength and poor impact resistance. In the welding of chrome-moly steels, this statement is open to debate on almost all points. Taking a specific example, in welding 0.125 wall tubing, the upset pressure was dropped to 7000 p.s.i. In photomacrographs taken, there were no indications of porosity or inclusions.

Probably in mild steel which may contain many impurities, there would be slag inclusions with too low an upset pressure. Concerning tensile strength, in all cases, the low pressure welds broke outside of the weld when the weld was tested in the unheat treated state. The outstanding characteristic of the low pressure weld was its extreme ductility as compared to that of a high pressure weld. In every low pressure weld there appears a white line directly through the weld.

According to metallurgists this line may be caused by a variety of things and there are various opinions about whether or not it is harmful. From work carried on up to date, the belief is that this line is not harmful if the weld is to be used in the unheated state, that is, the strength of this white line is more than that of the parent material. It is questionable whether with an exceedingly high strength heat treatment this line will heat treat to the desired properties.

In summing up the effect of pressure, the following recommendations are made: If the weld is to be used without further heat treatment or annealing, a minimum of upset pressure should be used, thus resulting in a ductile weld. However, if annealing or further heat treatment is in order, the upset pressure should be increased to about three times the minimum value since the resulting brittleness will disappear with heat treatment and with increased pressure the white line is not so predominant.

Speed of Upset: As in any flash welding, the speed of upset is very important with 4130. There are reasons to believe that the faster the upset, the better the weld and perhaps the less pressure required. One reason, of course, for desiring a fast upset is to prevent oxidation of the high temperature weld surfaces.

Die Opening: As explained before, the chilling effect of the dies is quite large and has much influence upon the brittleness of the weld. For this reason the die opening should be kept greater for 4130 than for mild steel.

Limiting factors which must be taken into account however, are the design of the pieces being welded, the ability to hold alignment and, on very light wall tubing, the deformation of the tubing under upset pressure.

There is some question as to whether

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• Sulphite-Treated Steel has had a "bath." Silica and Alumina, present in steel, are abrasive impurities which Sulphite-Treatment removes.

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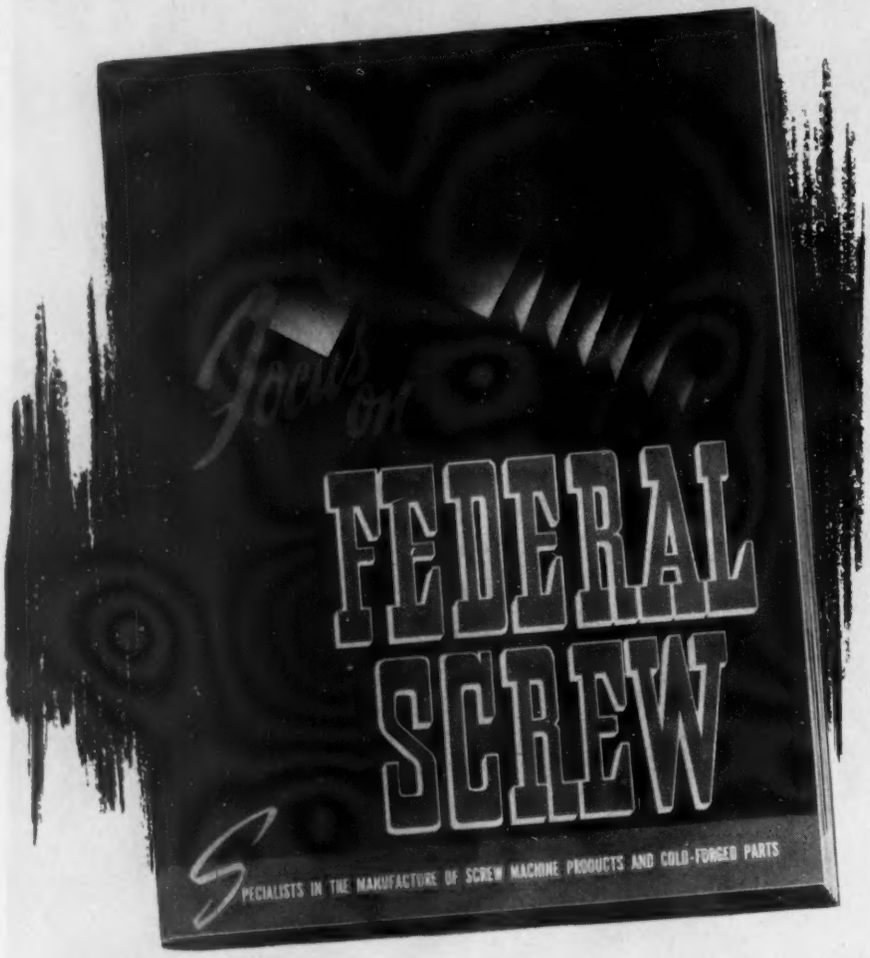

This large illustrated booklet shows at a glance what Federal Screw Works can do in the contract manufacture of screw machine products and cold-forged parts. There are many full-sized photos and sectional drawings of typical parts we're producing, involving all screw machine and secondary operations, plating, cold upsetting, etc.—the sort of work we can do for you to simplify your production problems—and a quick pictorial trip through the plant shows the facilities available to do it.

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MAIN OFFICES: 3401 Martin Ave., Detroit 10, Michigan

the die opening should be a function of the wall thickness or of the tubing diameter or of both. The following table takes into account only tubing diameter but should work all right for the common wall thicknesses:

Outside Dia. of Tube	0.375	0.500	0.750	1.000
	1.250	1.500	2.125	
Dies at start	1.00	1.25	1.50	1.75
	2.00	2.00	2.00	

Flashing Time: Like burnoff and upset, the flashing time is a function of wall thickness and is quite critical in the thinner wall tubing. It is critical more from the extent of keeping a consistent flashing time after a good weld setting has been found than in an initial setting since cam design, machine operation, preparation of work and amount of upset are all influencing factors. Therefore, the values given in the following table can be varied depending upon other conditions.

Like flashing time, upset time is a function of the wall thickness and is of extreme importance for obtaining good welds. For thin walled tubing, it has been found necessary to cut off the current before upset in order to prevent burning off the tubing or overheating the weld. In thicker tubing the current should be kept on until the upset is completed and perhaps some annealing action might be obtained if it is left on even longer. For heavy walled tubing, the danger lies more in cutting off too soon than in cutting off too late. Speed of upset is of great influence upon the required current carry-over.

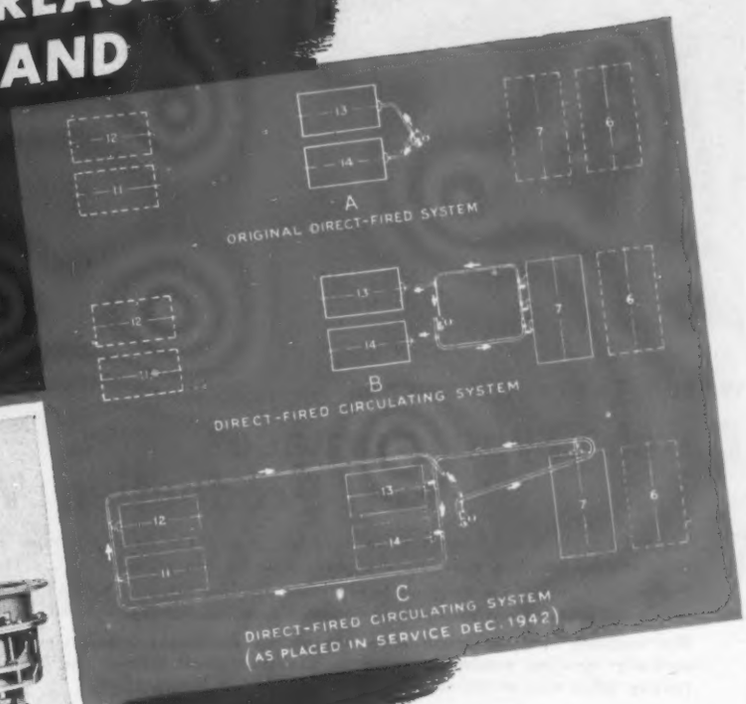
Wall Thickness	0.035	0.49	0.065	0.083
	0.125	0.156	0.250	
Flashing Time-Sec.	3.5	4.5	5.5	7 10.5
	15	25		
Upset Time, Cycles	3	5	7	9 10.5
	15	30	Approx.	

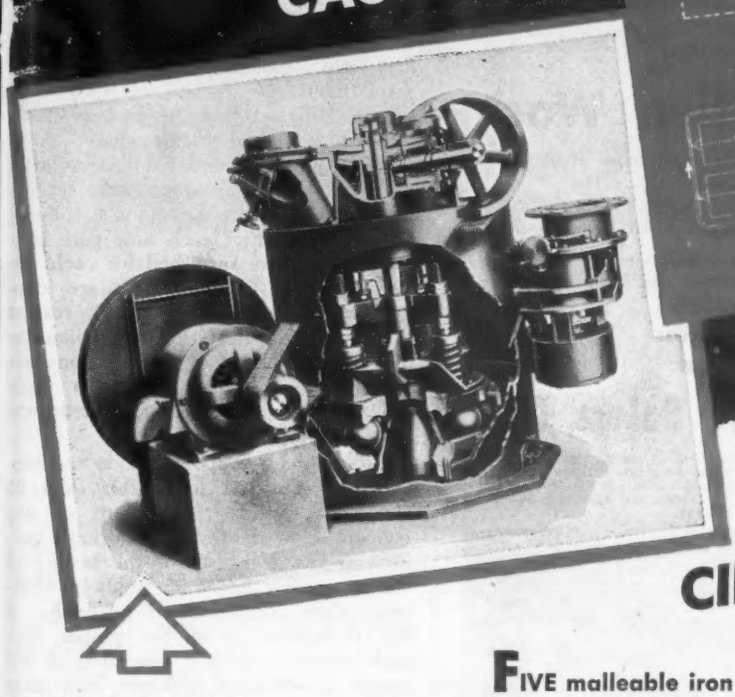
Secondary Voltage: In welding 4130, the secondary voltage should be kept as low as possible. The customary procedure in making a setup of chrome-moly is to adjust the die opening, flash and upset distance, pressure, flashing and upset time to the desired values and then to increase the secondary voltage until no freezing is encountered. The effect of too great a secondary voltage and consequently too great a current is to cause large flash particles to be thrown out thus leaving not only large irregularities on the weld surface to be closed up, but also resulting in incomplete fusion in the case of 4130.

If very small particles are thrown out at the start but, near the end of the flashing, large pieces of metal are emitted, the fault lies not with the secondary voltage (since it is as low as it can be without causing freezing) but with the cam design. Sometimes by increasing the edges of the tubing or forging, the voltage can be dropped another tap.

A cam which has worked very satisfactorily for chrome-moly is one which

PRODUCTION INCREASED, HEATING CYCLE AND FUEL COST CUT, IN ANNEALING MALLEABLE CASTINGS





WITH DIRECT-FIRING PULVERIZED-COAL CIRCULATING SYSTEM

The B&W Type B Pulverizer, widely used in pulverized-coal systems for firing boilers, cement kilns, and metallurgical furnaces—where sustained capacity and fineness of product, and continuous low-cost operation, are desirable.

FIVE malleable iron annealing kilns converted from hand-fired coal to the B&W Direct-Firing Pulverized-Coal Circulating System by the steps indicated above now operate with a reduction in fuel cost of 23 per cent, a greatly reduced heating cycle time, and increased production.

The results being obtained with this application of the B&W Direct-Firing Pulverized-Coal System can readily be duplicated. With this system, the pulverizer can be set where convenient and the fuel-circulating piping led to one or more furnaces, with multiple take-offs to burners at individual furnaces. Kiln temperature is controlled by similar methods as with oil and gas firing, and with the same ease of operation. Fuel distribution and capacity of the system, whether for single or multiple furnace operations, is assured by automatic control of coal-to-air ratio, by selection of the proper sizes of pulverizer, distributing fan, burners, and distributing line—details that are readily determined from the wide experience of B&W with pulverized-coal firing.

The merits and economy of pulverized-coal firing for metallurgical furnaces are discussed in B&W Bulletin 3-333, a copy of which will be sent on request.

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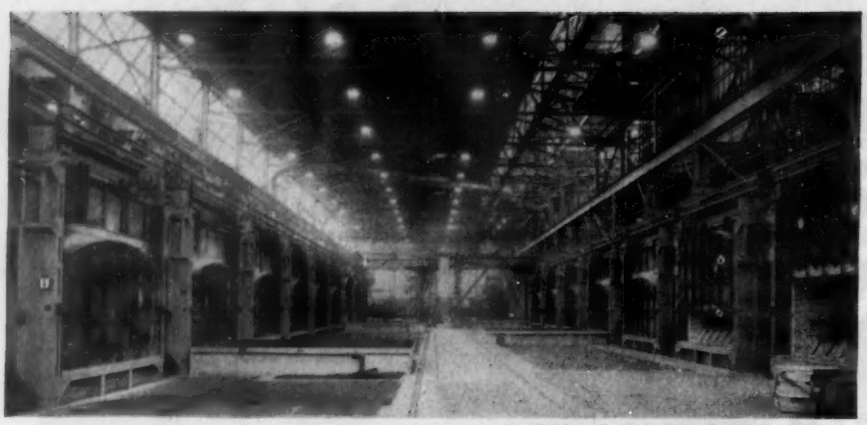


An EF installation of gas-fired furnaces with quenches and gantry cranes for various annealing and heat treating cycles on large parts and products.

We build both continuous and

Batch Type Furnaces For Production Work

We build them in single units or in batteries; in any size or any number of units required—for handling most any size product or for any process.

The above furnaces for handling heavy parts and the furnaces below for handling very small products are examples of EF batch type installations.

This company has also made some outstanding continuous installations for automatically handling products ranging in size from small springs and bolts up to railway axles; also structural shapes up to 90 feet in length.

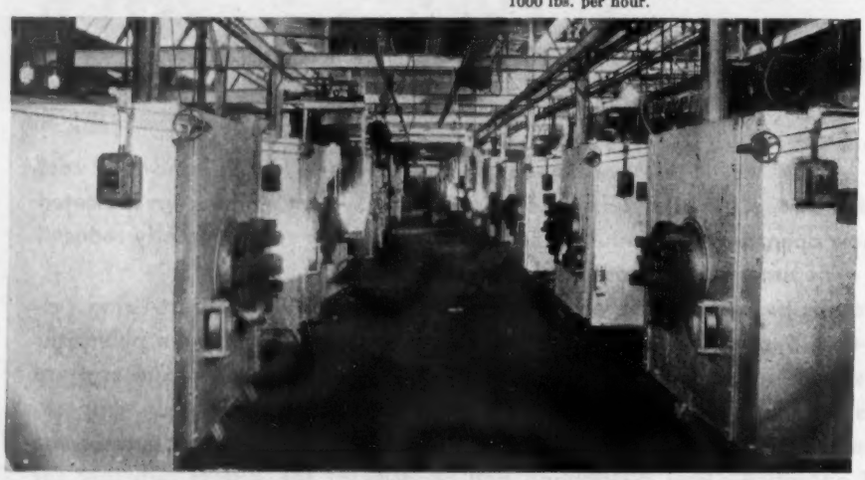
Contact us regarding your furnace problems.

No Job Is Too Large Or Too Unusual

The Electric Furnace Co., Salem, Ohio

Oil, Gas and Electric Furnaces

Small parts such as gears, pinions, bolts, bearing parts and other products are carburized in EF rotary gas carburizers such as shown below. Sizes shown are handling 500 and 1000 lbs. per hour.



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SALEM, OHIO

at the beginning of flashing has a rise of 0.0005-inch per degree and at the end of flashing a rise of 0.0055-inch per degree. With this cam, it is desirable to bevel the edge of one tube at an angle of 60 degrees with the centerline of the weld.

Inspection of Flash Welds: At the present time we feel there is no conclusive method of nondestructively testing flash welds. While extensively tried, the X-ray has showed very little promise or has given little indication of the strength of a flash weld. In use at the present time is magnetic particle inspection or Magnafluxing. It has been slightly more successful in that it will reveal very bad flaws due to lack of fusion but it has not as yet been able to differentiate between good welds and those which, while containing no serious flaws, are considerably below the desired strength.

It is believed that the best available inspection method is the close control of the equipment and the process after the machine has been properly set up. One good method of testing is as follows: On the first lot of each new part, four test coupons are furnished for each different weld. These coupons are identical to the production parts with respect to material and heat treatment, diameter and gage. Three of the coupons are tested to destruction in tension while the fourth is subjected to microscopic examination.

In addition a coupon is made and subjected to the test load after each 25 succeeding welds. A failure of any coupon below the test load during a production run is cause for the testing of the proceeding lot of 25 welds to determine their acceptance or rejection. If the equipment is of the proper type and properly qualified, this method will result in obtaining 100 per cent satisfactory welds.

Silver Solder, Borax Flux Used in Brazing

A new method of brazing small round wires with diameters of 0.0226 to 0.049-inch has been adopted in the Distribution Transformer Division at General Electric Co.'s Pittsfield Works. A mixture consisting of equal amounts of filed silver solder and borax flux is used.

The end of one of the two wires to be brazed is either moistened or heated and then inserted in the container holding the mixture. When a sufficient amount adheres to the wire, the two ends being brazed are placed together and heated over a gas flame until the alloy fuses them. If normal heating is applied, joint will be free of lumps and points, eliminating a finishing operation before the braze can be insulated.

In the conventional method of brazing these small wires a strip silver alloy and flux was used. This resulted in a loss of the silver both from drip at the braze and from an excess of brazing material at the point of contact. About 80 per cent of the strip alloy now is saved.

Make 10 types of prints instead of 1

SOUNDS INCREDIBLE if you've been seeing only one type of print year after year.

But when you are one of the thousands using Ozalid, you know this is possible . . . and how much it means to have a choice.

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You are constantly finding new uses for OZALID — for one type of print or another. Not in the drafting room alone, but in all departments. For example, with Dryphoto, photographic subjects can be reproduced for use in the shop, or for sales, advertising or general display purposes.

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Why you get 10 instead of 1

An Ozalid machine is different. It produces a positive reproduction direct from your original in only two steps—*Exposure* and *Dry-development. All* ten types of Ozalid prints are produced in this manner, in seconds—without additional equipment.

Since no baths or driers are employed — there is no distortion, there are few "limitations." So far, OZALID RESEARCH has created ten different and practical types of sensitized materials utilizing the unique dry-developing principle.

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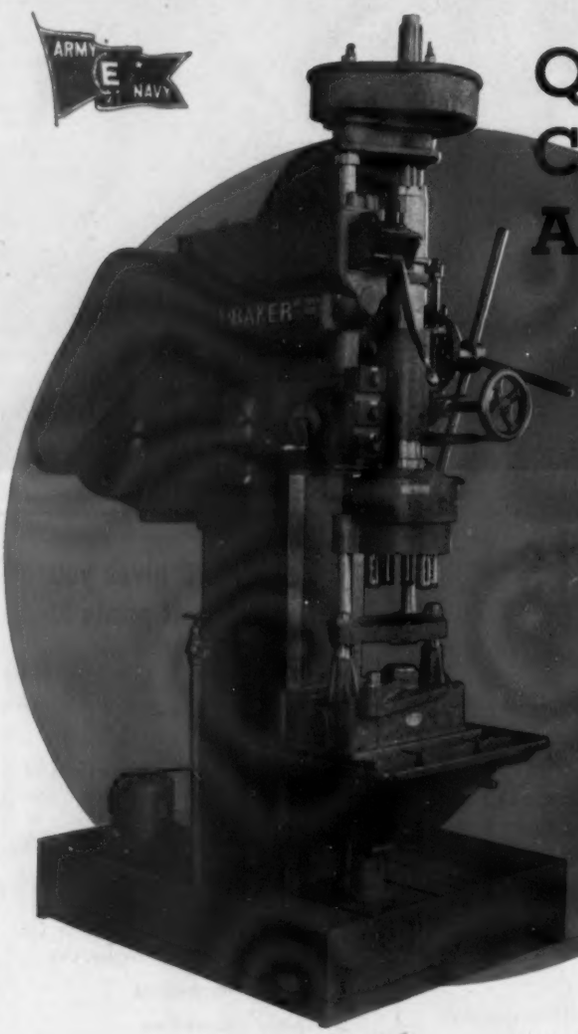

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Sponge Iron

(*Continued from Page* 108)

average sample of this ore, washed and crushed to minus 6-inch, gave the following analysis:

Element	Per cent
Iron	50.1
Phosphorus	0.105
Sulphur	0.009
Silica	10.08
Alumina	3.95
Free moisture	1.4
Calcination loss	12.9

It was found that lumps of ore up to 10 inches diameter were readily reduced. The analysis of one such lump showed the percentage of reduction to be several points higher than the average reduction for the entire charge.

In a recent test run, 82.7 per cent of the iron in the charge was reduced to metallic iron. In the test, a burner was used to heat the reducing gases before they entered the reducing chamber. This slightly lowered the quality of the reducing gases.

III. Pelletizing in the Rotary Furnace. When operating the rotary furnace in the normal manner, as described under II, occasionally the reduced iron is rolled up into pellets which may become large enough to interrupt continuous production by clogging the 3-inch cooling worm of the furnace. During the early stages of the war, when it seemed that sponge iron would have to be used as a substitute for scrap, open-hearth operators expressed a decided preference for this pelletized form of rotary-kiln product because it was massive instead of bulky and comparatively low in silica and other slag-forming constituents, besides being of a shape more convenient for charging. The Bureau therefore proceeded to study the conditions necessary for pelletization. The results of this study, which is still in progress, have led to the following two modes of making direct iron in rotary kiln: (a) Simple pelletizing, (b) pelletizing and carburizing.

Simple Pelletizing. Pelletizing of the granular sponge iron made from the ore by solid-fuel reduction in the rotary furnace occurs when the composition of the gangue and the temperature are such that a viscous slag is formed, which greatly hinders the free movement of the reduced particles of iron as they approach the discharge end of the rotating furnace. As a consequence, the metal grains become agglomerated into small balls, ⅛-inch to 1 foot or more in diameter. During the pelletizing process, in which the small metal particles are being welded together to form the massive balls of iron, there must be something akin to squeezing, because the agglomerated pellets are low in silica and the major part of the slag can be separated mechanically after it has been cooled.

Pelletizing extends greatly the utility of the rotary kiln as a means of recover-

The fact of the matter:

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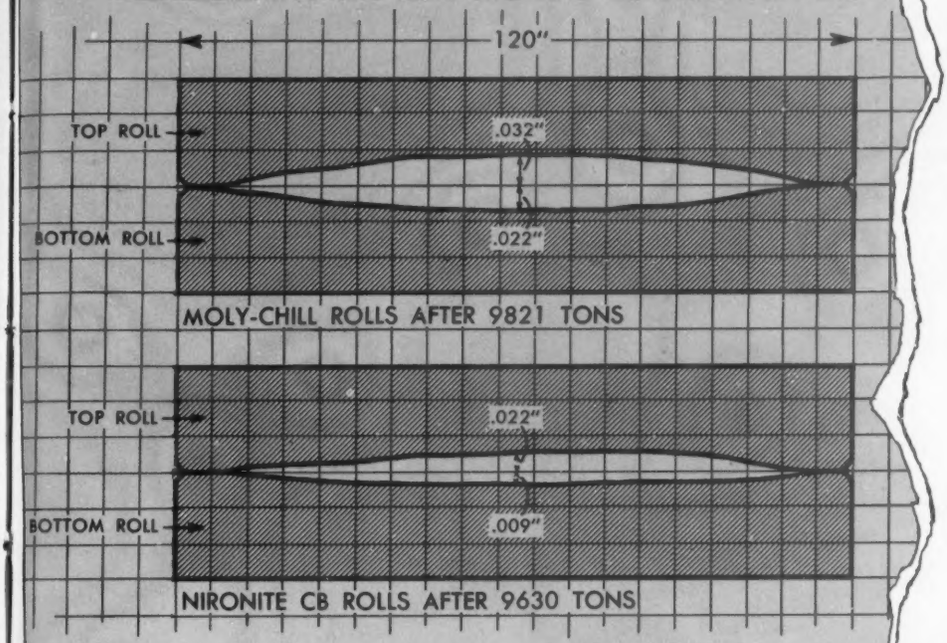
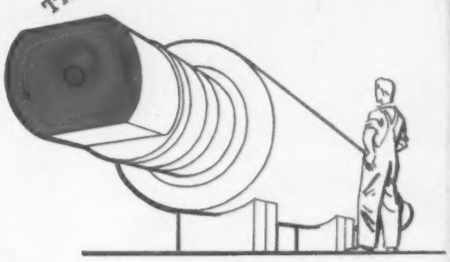


The rolls with the Red Wabblers



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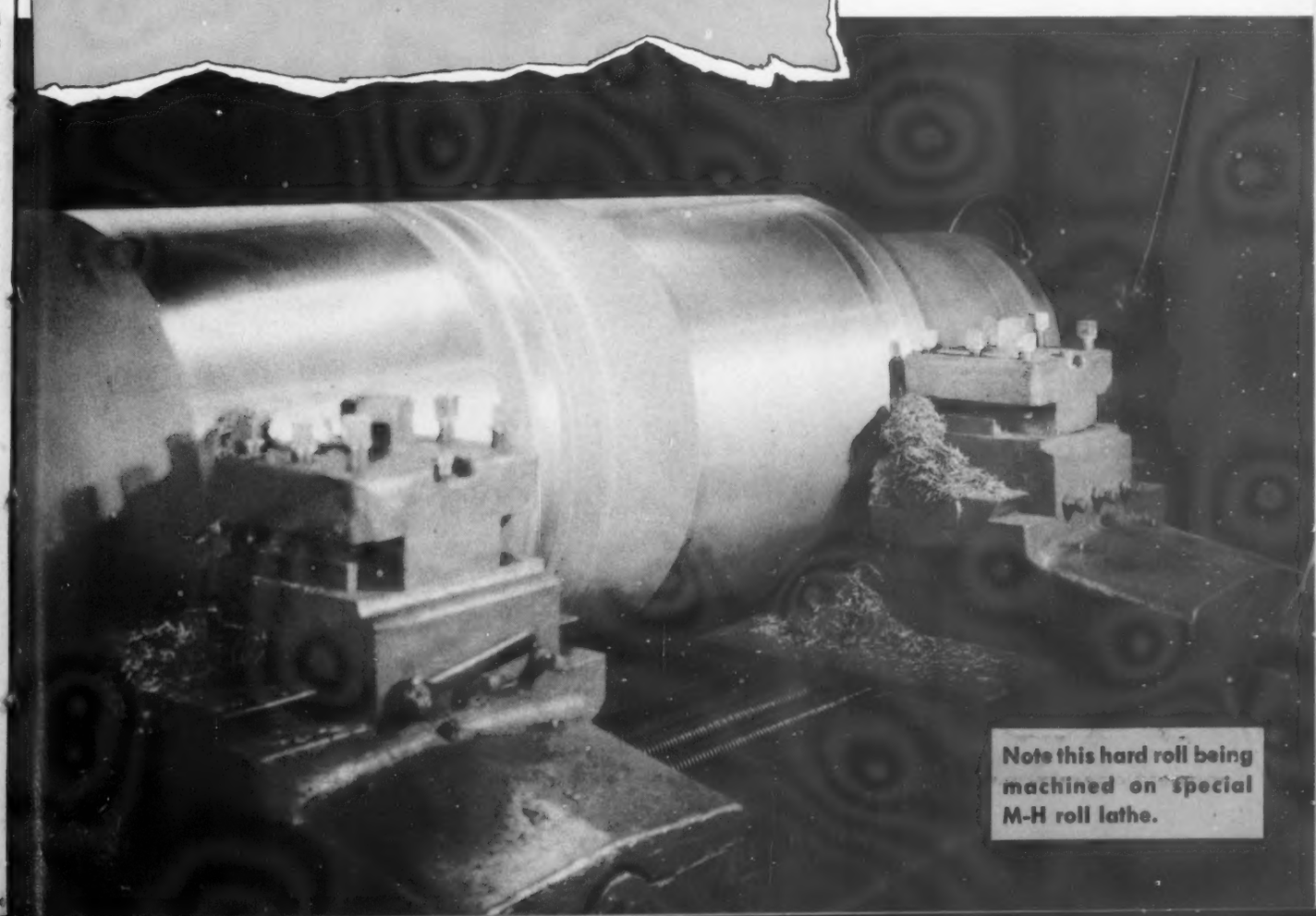
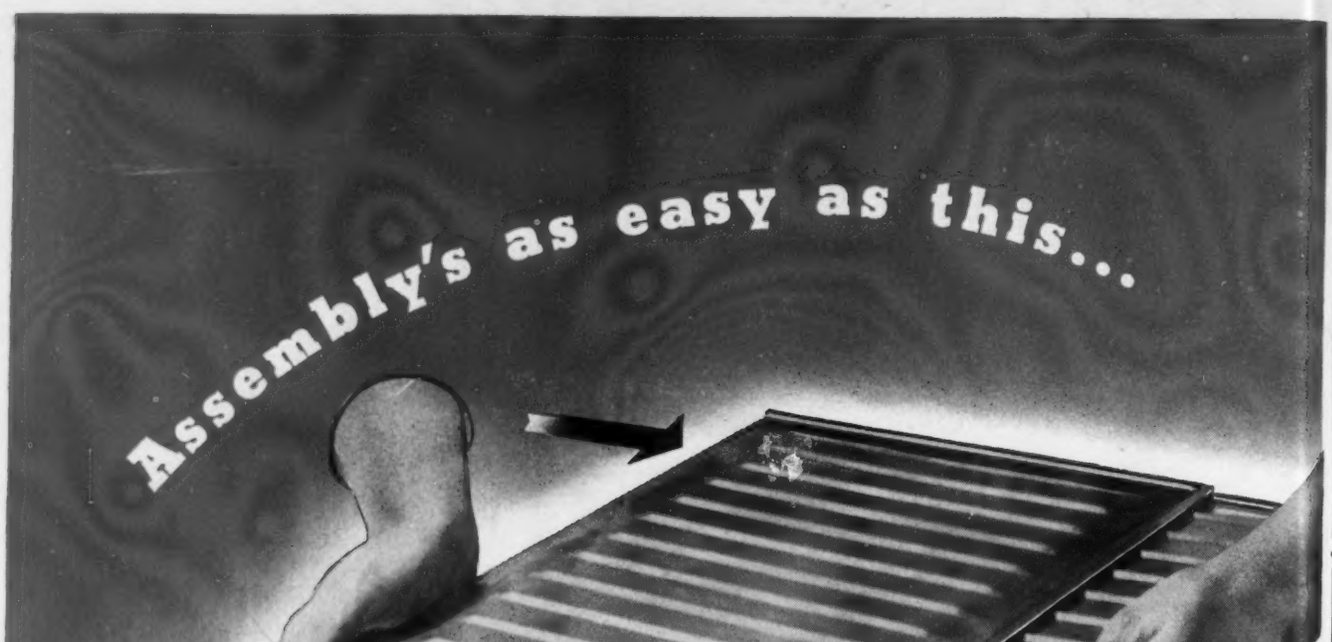


Note this hard roll being machined on special M-H roll lathe.



These "envelopes" of Alcoa Aluminum brazing sheet are automatically formed and folded so that they slip together to build up the heat exchanger shown below. Dip brazing, an operation requiring only a few minutes, then joins them and the housing into a rigid, gas-tight unit.

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McQuay, Inc., Minneapolis, engineered, developed, and manufactures the Boeing B-17 Flying Fortress' secondary cabin heat exchanger. Heated air from primary exhaust heat exchanger travels in one direction, and fresh air for cabin heat travels in another.

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ALCOA ALUMINUM

ing metallic iron from low-grade ores without preliminary beneficiation. In fact, 10 to 20 per cent of slag-forming gangue in the ore is actually an advantage in this method, which is peculiarly adapted for treating a considerable number of ores from deposits now not used because the ore will not concentrate satisfactorily even at fine sizes.

The discovery of the pelletizing procedure actually represents only a rediscovery of the Krupp-Renn process that has been in commercial operation in Germany since 1934. In 1939 there were either in use, or under construction, 18 furnaces of the rotary-kiln type, of which two had been working continuously on the pellitizing principle for four years.[8] There is an extensive German literature not only on costs of operation and on the types of ore and steelmaking processes where rotary-furnace pelletizing is of economic advantage, but also on purely technologic details, such as life of furnace linings. The literature will be a great help in the further development of this procedure as applied to conditions in the United States.

Pelletizing and Carburizing. Pelletizing under such conditions that the metal is carburized and collected in the molten state at the discharge end of the rotary furnace was successfully tried, originally as an attempt to produce direct hot metal for charging open-hearth furnaces. An iron of the following composition was thus obtained:

Element	Per cent
Total iron	94.0
Carbon	4.0
Sulphur	0.105
Silicon	0.047

This result served to draw attention to the low-silicon content of pelletized and carburized sponge iron. Further investigation indicates that this low-silicon content may be characteristic of all pelletized sponge iron, whether carburized or not, as is to be inferred also from published analyses of Krupp-Renn blooms.

Now an important class of the country's unused iron ores are those containing high phosphorus not separable by beneficiation. The most effective means of handling these high phosphorus ores by the "sponge-iron route" would appear to be solid reduction, carburization, and melting at low temperature to obtain low-silicon pig iron. Ordinary steel practice, of course, prefers about 1 per cent silicon, but the possibilities of devising a satisfactory method of dephosphorizing low-silicon iron appears extremely good.

Some relatively important high-phosphorus ores are also high-lime, and such ores would seem well-suited to a solid reduction process followed by carburization and melting in the kiln itself to low-silicon iron suitable for simple dephosphorization.

In recent tests, sponge iron made from Texas ore by natural-gas reduction was made into wrought iron in a puddling furnace at the plant of the Penn Iron & Steel Co., Creighton, Pa. The

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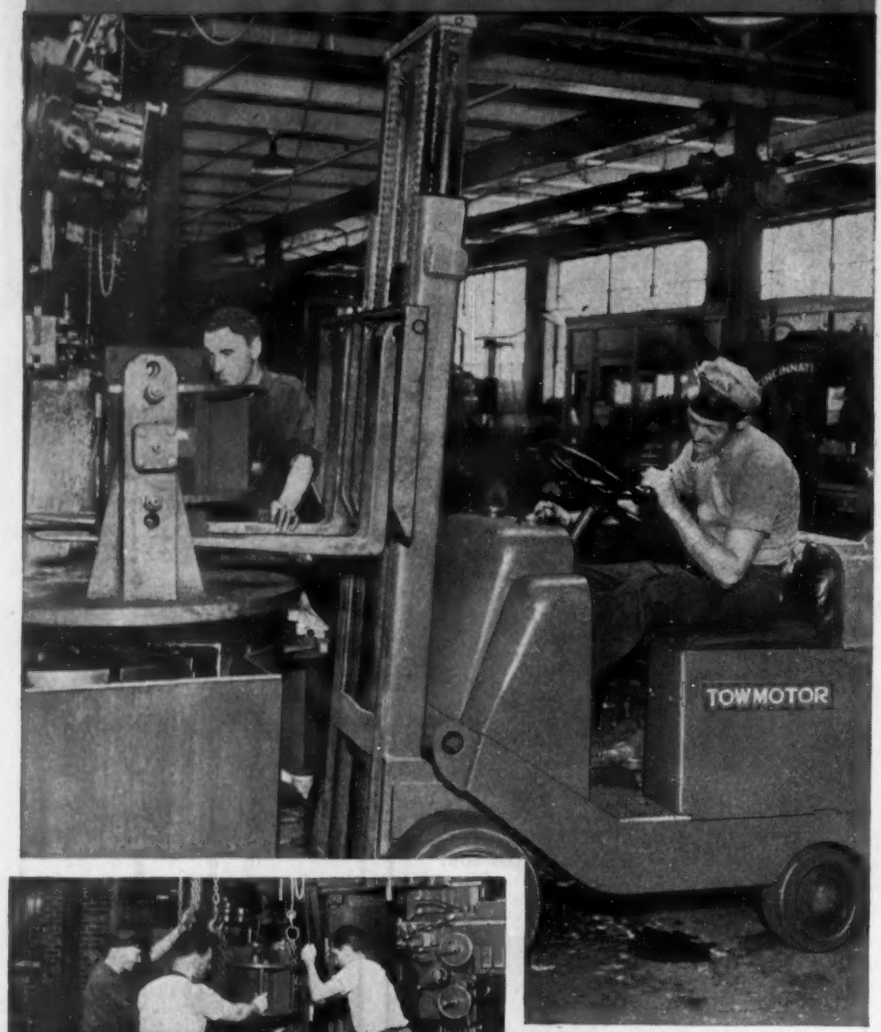

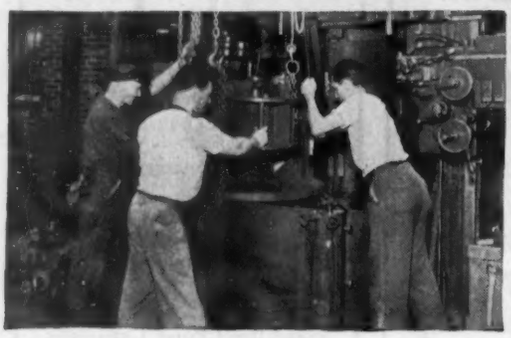

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analysis of this particular batch of sponge iron was as follows:

Element	Per Cent
Iron, total	73.4
Iron, metallic	57.9
Reduction	79.0
Sulphur	0.01
Phosphorus	0.104

Eighty per cent of the metallic iron charged was recovered as muck bar. The muck bar made was high in slag (7.36 per cent), the evolution of S was 0.007 and P 0.069 per cent. Composition of the slag was: SiO_2 15.08, Fe 74.4, and P 0.170 per cent. There was a considerable reduction of phosphorus from the sponge to the finished muck bar. If the slag were reduced to the usual figure of about 2 per cent, the phosphorus would be lowered further, certainly to a good wrought-iron phosphorus content around 0.054 per cent. This recent plant test revealed the important fact that the time necessary for working up a heat of sponge iron into wrought iron is only about half the usual time. This should have been foreseen because puddling is essentially an oxidizing refining by which the silicon and carbon of pig iron are removed, while modern sponge iron contains little or no carbon and all of its silicon content is already in the oxidized state.

Slag left in wrought iron must have an $FeO:SiO_2$ ratio of 5:1 if the product is to have the properties peculiar to wrought iron. The brickyard sponge iron used in making the brittle wrought irons contained 80 to 90 per cent metallic iron (that is, less than 5 per cent iron oxides) at a silica content of about 6 per cent. The resulting slag was the brittle fayalite. In other words, a poorly reduced sponge iron, like that cited in II (2), makes the best wrought iron.

Utilization of Sponge Iron in Steelmaking. Tests were made on the electric-furnace melting of sponge containing only 74.4 per cent total iron. One-ton charges of the approximately 80 per cent reduced material were heated in a standard 1½-ton, acid-lined, three-electrode, Moore Lectromelt furnace. Contrary to widespread belief, the 80 per cent sponge was not violent and highly reactive during melting but was remarkably quiet; the melt resembled that of a charge of iron turnings. There was no apparent damage to the furnace lining.

Data from three successive melting tests are shown in the accompanying table. In each of these tests the sponge contained 74.4 per cent total iron.

Carbon in addition to the approximately 31 pounds contained in the sponge iron was added in the first heat in the form of coke to prevent possible reoxidation of the charge and to protect the furnace lining from reaction with iron oxides. Scrap iron also was used in the first heat to assure an electric arc to begin the melting. Both precautions proved unnecessary and were omitted in the other heats.

During the early part of the melting period the sponge must be worked away from the sides of the furnace to prevent sticking.

There was no wild or vigorous froth-

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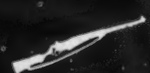

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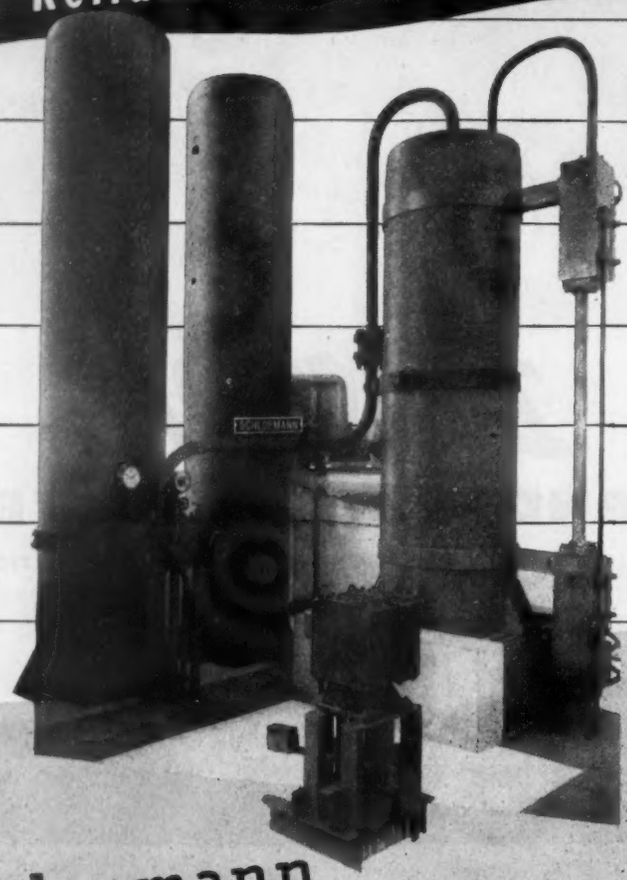

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ing action during the melts, and the process was under control at all times.

The high-carbon content of the sponge (1.55 per cent) required the addition of airon oxide to the melt charge for decarburizing. The quantity of carbon, and also of silicon and manganese, in the product was easily controlled.

The phosphorus in the high-phosphorus ore used in the tests was not removed in the process.

Several castings poured from the melted metal were normal in every respect, except for the high-phosphorus content.

About 30 plant tests have been made on the utilization of brickyard sponge iron, the results of which may be summarized as follows:

1. Brickyard (sagger) sponge iron made from commercial magnetite concentrates or hematite ores contains too much silica and other gangue material to be accepted by basic open-hearth operators as a welcome substitute for scrap because of the large volume of slag formed. Acid open-hearth and electric-furnace operators find this less objectionable.
2. The low bulk density (about 2.0) and shape of pigs of brickyard sponge iron cause inconvenience and loss of time in charging open-hearth furnaces. This item, too, is of no consequence in electric-furnace operation.
3. In other respects, charges of sponge iron up to 30 to 50 per cent of the total weight of metal charged cause no inconvenient or time-consuming modifications in operating procedure and yield steels of the desired composition and properties.
4. Sponge iron has the following unique advantages in steelmaking:
   a. Less difficulty or no difficulties caused by residuals.
   b. Greater ductility and less susceptibility to aging imparted in making low-carbon steels.

Granular sponge iron made in the rotary furnace as described in II (2) has been tried as a substitute for scrap in a 4-ton experimental basic open-hearth furnace. The granular material used for this test was made from superbeneficiated magnetite containing only 0.60 per cent silica and thus avoided the large volume of slag characteristic of brickyard sponge iron made from commercial ores. Contrary to the opinion almost universally held by open-hearth operators, this granular material did not blow out of the furnace to any noticeable extent. In fact, granular sponge iron is superior to the brickyard pigs in that it overcomes the objection against low bulk density; the granular material occupies about the same volume in the furnace as an equivalent weight of heavy scrap, and by filling the voids is advantageous when a large percentage of light turnings scrap is charged.

Conclusions. The Bureau of Mines two-diameter rotary-kiln method of making granular sponge iron has been further improved to yield a low-sulphur iron suitable for steelmaking. The granular form of the sponge iron not only does not unfit it for charging open-hearth furnaces but is actually an advantage in that it fills the voids existing in the charge before melting. This method of making

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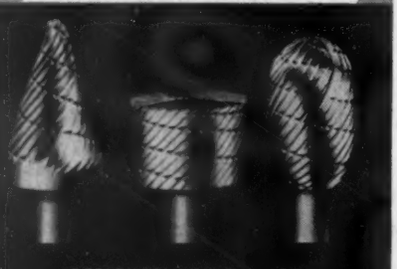

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granular sponge iron is comparatively simple and requires relatively cheap equipment but has not yet been tried on a sufficiently large scale to permit making cost estimates.

Two new operational variants, involving pelletizing, have been discovered, which may be considered similar in principle to the Krupp-Renn process and like the latter process are specially adapted for the treatment of low-grade ores, particularly such as are unconcentratable. This type of process yields an iron of low-silicon content, which is thought to offer a feasible method for making high-phosphorus ores available in steelmaking.

Brickyard sponge iron is lower in sulphur, even when made with high-sulphur heating and reducing carbons, than any other direct iron, except that made by gaseous reduction. The unsolved problem of lowering the sagger cost per ton of iron, however, limits its field of applicability to making high-purity sponge iron by the reduction of superbeneficiated magnetites. Where such a supersponge iron commands a premium price, the sagger method may be justified.

Other methods of making sponge iron have not yet passed the pilot-plant stage, except that used at the Warren, O., plant of the Republic Steel Corp., which, however, has been in operation only a short time.

The field of application of direct irons seems to be not as a substitute for scrap except in emergencies. Emphasis is gradually being shifted to the metallurgy of sponge iron; that is, toward the study of the new technologies that can be evolved (a) for converting the various types of direct iron into wrought iron, steel, and other marketable ferrous products and (b) for recovering useful metal from the larger unused iron-ore deposits of the country.

---

[1]S. R. B. Cooke, Microscopic Structural and Concentratability of the Important Iron Ores of the United States: Bureau of Mines Bulletin, 391, 1936.

[2]R. C. Buehl and E. P. Shoub, Production of Low-Sulphur Sponge Iron: *Mining & Metallurgy*, Vol. 24, Dec. 1943, p. 550.

[3]C. E. Williams, E. P. Barrett and B. M. Larsen, Production of Sponge Iron: Bureau of Mines Bulletin 270, 1927.

[4]B. W. S. Kalling and Carl von Delvig, Process for Purification of Iron from Sulphur: U. S. Patent 1,971,041, Aug. 21, 1934.

[5]Cited in footnote 2.

[6]J. H. Jacobs, J. W. Hunter, W. H. Yarroll, P. E. Churchward, and R. G. Knickerbocker, First two Years Operation of the Bureau of Mines Electrolytic Manganese Pilot Plant at Boulder City, Nev.: *Metals Technology*, Aug. 1944, pp. 1-21.

[7]C. G. Maier, Sponge Iron Experiments at Mococo: Bureau of Mines Bulletin, 396, 1936.

[8]F. Johannsen, Present Status of the Krupp-Renn Extraction Process (in German): *Stahl und Eisen*, Vol. 59, No. 37, 1939, pp. 1041-1046.

—o—

Production of alumina from bauxitic clays found in the Pacific Northwest will be undertaken by Columbia Metals Corp., whose plant at Salem, Oreg. now is nearing completion.

Processing and Packaging

(*Continued from Page* 136)

ment of the large earthmoving unit shown in Fig. 1 required special marking and special rust inhibiting treatment beyond ordinary civilian domestic shipments. However, such special processing represented very little additional material investment or labor.

Unit shown in Fig. 2 was designed to take care of the majority of machined parts such as sheave wheels, gears, pinions, pins, drive shafts, nuts, bolts, cotter keys, etc. In this unit, the first two —and in many respects the most important—operations are accomplished. First, the washing, rinsing and drying of the parts (cleaning); and second, the dipping in an almost universally applicable corrosion-preventing compound and the drying of the compound on the surface of the parts.

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This unit occupies a floor space and working area approximately 25 feet wide by 50 feet long. An overhead monorail is provided with a series of baskets which can be loaded, processed on a line production basis, and unloaded. Baskets are thoroughly washed as they return to the beginning of the cycle on the endless monorail. Only two men per shift are required to operate this unit. By operating two shifts a day on a 50-hour-week basis, almost $750,000 worth of parts can be processed per month.

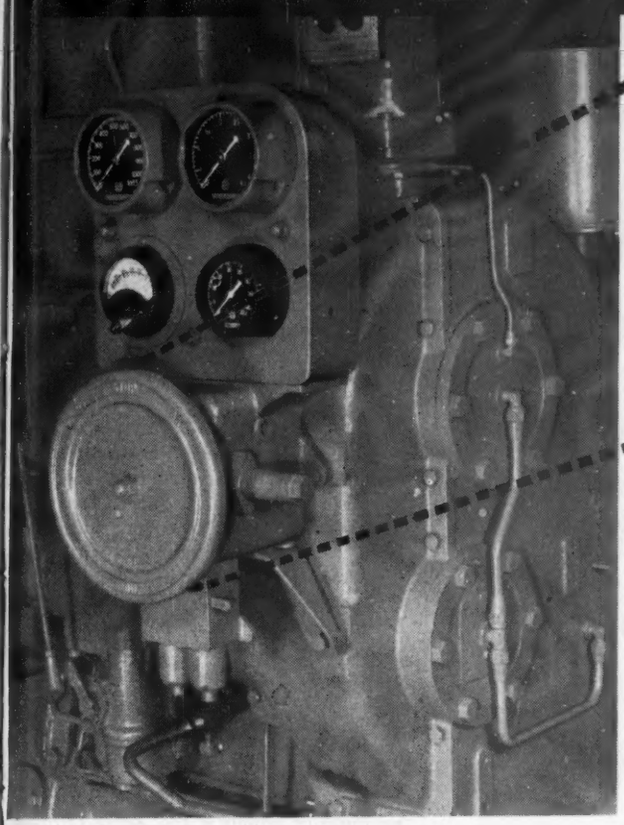
Another phase of packaging which lends itself to a semimechanized type of organization is the special export wrapping which many highly mechanized parts and assemblies require, followed by labeling, dipping in sealing wax, and cartoning or boxing.

The rotating table shown in Fig. 3 was developed to eliminate handling of parts and to make the wrapping more easily adaptable to women workers. Reduced handling and automatic organization of work performed by a mechanized unit greatly increases efficiency of the operation. Parts are fed on to the wheel at one point together with special wrapping papers and labels and are wrapped as the wheel rotates back to the starting point. The women thus have work brought to them automatically while seated at the work stations. Parts then are dipped in special sealing wax in two successive operations and are placed in labeled cartons for physical protection and identification, being removed automatically after they are wrapped.

These two mechanized units considerably reduce the possibilities for making mistakes in routing and in labeling parts, and also reduce the problem of supervision in the department, inasmuch as it was set up as a mechanized line of operation.

Other equipment used in processing of parts includes work tables, roller conveyors for moving parts and cartons from one end of the processing line to the other, rubber stamps for marking car-

Just a Part-turn



Control end of Cooper-Bessemer 675 hp Type JS diesel showing simple gas-oil control mechanism

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Cooper-Bessemer's new and sensational development, the gas-or-oil diesel, not only makes virtually any combustible gas an ideal fuel, safe and entirely practical, but the downright simplicity of switching from one fuel to the other is in itself a remarkable feature. It offers revolutionary possibilities in its application to numerous power requirements.

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3. Since the thermal efficiency of a Cooper-Bessemer diesel is so much higher than that of the best gas engines of the other type, *20 to 25% less fuel* will be required for a given power output. Or, correspondingly more work can be done with a fixed or limited fuel supply.
4. A single, surprisingly simple control permits instantaneous change-over to oil fuel or vice versa *at continuous full load.*
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6. Gas-oil proportion or complete fuel change-over may be *automatically* controlled to conform exactly with fuel supply and load requirements.

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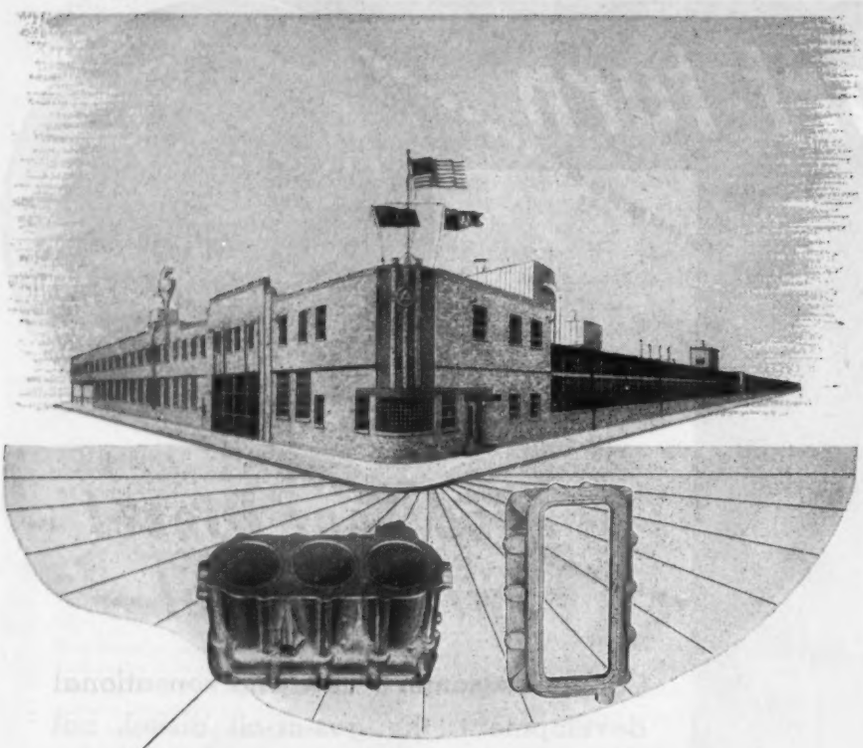

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tons and various other items of equipment.

It became evident quite early in the organization of the parts packaging job that a special paper cutting operation would increase the overall efficiency of the department. The table shown in Fig. 4 was constructed so paper rolls of various types and lengths could be unrolled quickly, measured and cut easily and then placed with parts as they were sent to the wrappers. By cutting all of the paper in one place, the various kinds of paper, tools for cutting, measuring templates and cutting straightedges are localized so one or two trained persons, women in this case, were able to do all paper cutting. As these papers are expensive and have been on the critical materials list, it is a further advantage to have cutting done in one place so scraps can be used to best advantage.

Special Materials

Material introduced for wartime processing serve fundamentally the same purposes as those produced for peacetime operations. However, there have been many developments and improvements to help parts withstand greater extremes to which they are subjected. In many cases there has been an improvement in the product for use in mass production operations, although in many cases there has been little improvement in the price of materials.

One improvement which probably will be of lasting and genuine importance is in certain types of rust inhibitors, one example of which is the Army Ordnance AXS673 rust inhibitor which is applicable to a very large variety of parts and pieces of finished equipment. Among the best of the products meeting this specification are some which are relatively inexpensive and can be applied by a simple dipping, spraying or painting operation. They dry within a few minutes to a surface which is self-healing, dry to the touch, and uniform. With such a material, the basic problem of storage of parts and preparation for even domestic shipment is much simplified because almost all machined parts can be washed and preserved with a preservative by a line production unit such as the one shown in Fig. 2. They then are further processed for special military or export shipment, or simply placed in the final container for domestic shipment or for the assembly line.

This type of material is easily removed prior to assembly, does not pick up dust readily, provides a very adequate protection in a wide range of temperatures, and withstands handling well. It also is used to cover all exposed machined surfaces, moving parts, threads, nuts, pins (including wire rope) on finished equipment as shown on the tractor in Fig. 5. It is applied by either spraying or brushing in such cases.

Special papers, including wax impregnated self-sealing papers which are used on many parts which must be completely protected—bearings, oil seals, special assemblies and especially fine machined parts — together with special sealing

waxes provide a relatively efficient and highly successful means of protection of such parts even against submersion in salt water or prolonged salt spray exposure. Sealed cellophane bags serve the same purpose for certain classes of parts according to recent experience.

These products will probably have a peacetime significance, as the fundamental research and cost of their development will largely have been charged to the expense of the war. They will probably be readily available and very useful after the war.

Development of rust inhibitors applicable in oil or in grease for the preservation of such parts as motors, bearings, etc., represents improvement over products available prior to the war. They also should be available for export shipments and even certain domestic applications in the postwar period.

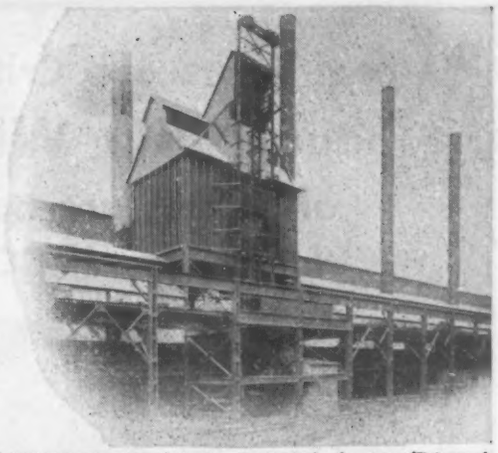
Cartons Are "Engineered"

Another wartime problem was procurement of standard cartons for a larger percentage of products, especially spare parts. Engineering of cartons for parts is a considerable undertaking. For many parts only the large volume necessitated by military operations made the quantities sufficiently large to justify the engineering of cartons and containers at the beginning of the war. Cartons and containers established for many parts with the name, part number and descriptive matter of the manufacturer on them add to the convenience of handling, provide better mechanical protection, facilitate better use of storage and give greater eye appeal to packaged parts. It is almost certain that they will be retained to a great extent after the war.

The carton storage rack and addressing machine shown in Fig. 6, and the carton closing stitcher shown in Fig. 7 are investments associated with the cartoning program. The addressograph is also used for marking tags and individual part labels. These units probably will be held over for peacetime use.

There are still great possibilities for improvement in the materials used for corrosion prevention and for packaging in the future. Notwithstanding the tremendous improvement which has been accomplished during the war in many materials and notwithstanding the probabilities of reasonable prices for such materials after the war, there is a need for materials which will much more efficiently protect the surface of steel products (as well as other metal surfaces) from corrosion. There is also considerable room for improvement in the economy of handling and application of all preservative materials.

One of the biggest fields for real improvement is that of the ease of fastening identification tags, labels or markings upon pieces of equipment. One of the most serious problems that has been encountered in the preparation of spare parts for the armed services has been that of maintaining the identity of the part in all stages of its wrapping, so that whatever happens to any of the outer layers of the wrapping of the part, it



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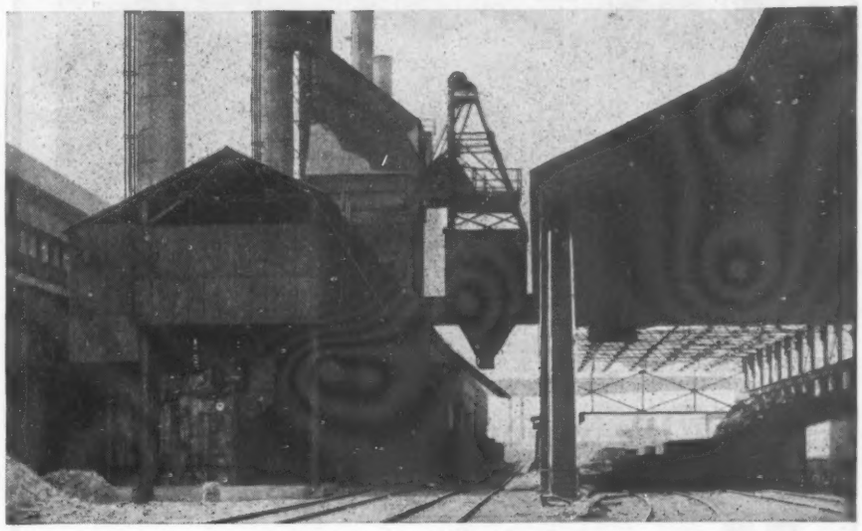

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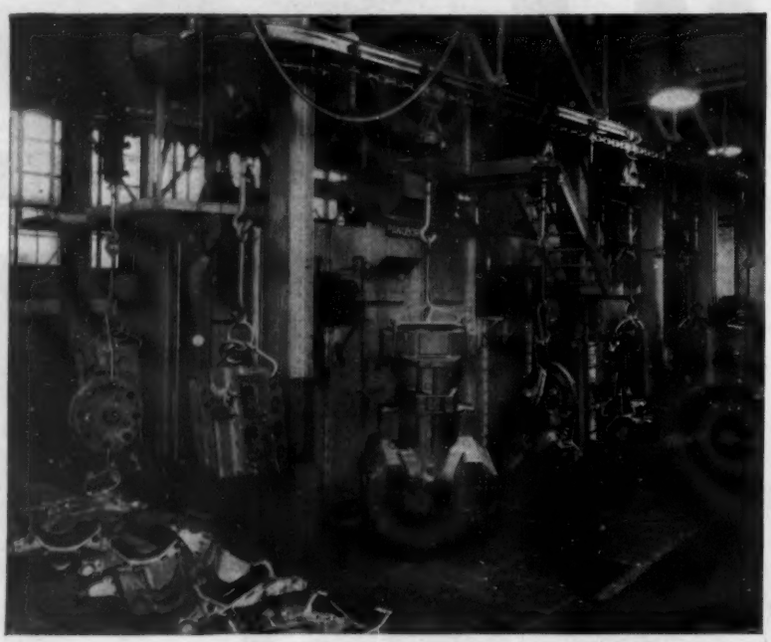

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may be identified by anyone at any time who needs to know what the package contains.

The development of large cellophane-like containers and procedures for their use to protect large assemblies such as motors, the development of materials for such purposes as mold and fungus-action prevention in the tropics, for the extremes of heat, moisture and cold as encountered on the various widespread battle fronts of this war have greatly widened the horizons of packaging and processing and caused the development of more universally applicable materials for processing of equipment. This fundamental research has produced a tremendous variety of specialized products; and also has produced many very practical and somewhat generalized products which are in general use at the present time, and which probably can be used effectively in a peacetime economy. This will be especially true where the industry enjoys an appreciable amount of export business.

War Accelerated Training

With the need for more complete (and more complicated) protection brought about by the war, there was need for organization of procedures and fundamental education of everyone concerned. This education entailed training workmen, many of whom had never worked in plants before and many of whom were women, in detailed and precise operations of wartime packaging. It also involved the training of supervisors, plant managers, sales managers, servicemen, and almost everybody in the organization in the need for precision, high quality work and observation of details, the value of good packaging and what constituted well processed and protected goods.

First requisite of this program was the establishment of a series of written procedures based upon and meeting the military agencies' specifications which classified the different parts or pieces of equipment into certain groups, and included a specification for each class which met all of the requirements for processing of parts within that group. These procedures included a description of the objectives of the procedure, materials used, class of parts to which it pertained, specific operations involved in processing each class, and a specific procedure number which covered each class of parts. Under the procedure number were the individual steps, in great detail, for the parts covered by that particular procedure.

Procedures were established to be as all-inclusive of parts as possible, and to use as few fundamental processing materials as possible, as it was found that the fewer parts and such processes involved, the fewer mistakes were made. Also, the fewer combinations of materials and procedures, the more economical the total operation would be from the standpoint of materials, supervision and overall efficiency. In some cases there was provided a slightly greater degree of protection than actually would have been

required by the parts. This was a means of simplification of the overall problem and keeping down the number of special procedures which had to be followed. This principle simplified the education of the workmen, and also simplified the education and the duties of the foremen, inspectors and supervisors of the packaging operations.

As originally organized and established, the procedures included only two classifications: One for domestic civilian use; the other for export and military use, considering that all parts which are sent to government depots must be processed to a degree equivalent to the most rigorous processing required for overseas shipment for any military goods.

The highly machined shaft shown in Fig. 8 illustrates the successive steps—washing, dipping in rust inhibitor, wrapping and labeling, sealing in wax and cartoning—which constitute an export, or military, order preparation. For domestic civilian use the part would be washed, dipped in rust inhibitor and cartoned. These techniques, therefore, will be usable without change, if it is considered desirable to do so at the close of the war.

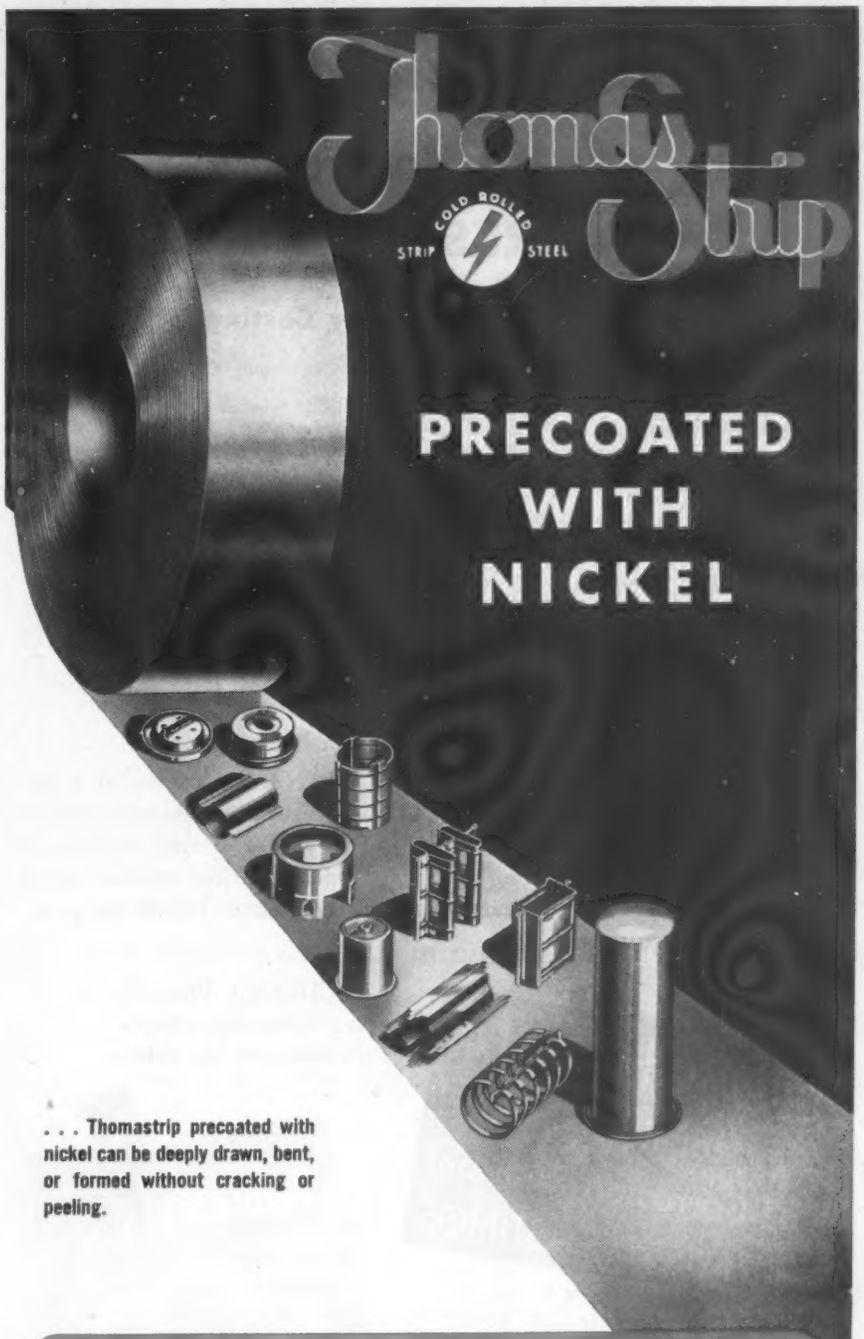
Procedures Are Justified

These procedures, when first introduced by war necessity, were looked upon as being extremely complex, unproportionately expensive, and perhaps overcomplicated. Now they are largely accepted as justifiable, reasonable, and even desirable.

This educational program has also been operative in other fields which will probably be significant to the industry. Members of the armed forces in all of mechanized divisions and construction divisions together with their allied supply and maintenance personnel have had demonstrated to them the preparation of products for shipment to meet extreme conditions, and the serious results of lack of such preparation. As future customers and users of equipment of all kinds, their ideas of standards which are possible and desirable will no doubt be reflected in future sales policies and processing practices. The same may be said for many government employes in depots and liaison operations between the armed forces and industry at the present time.

Extent to which parts and finished equipment will be processed following the war, will probably be dictated by a combination of two things: First, needs of the equipment, depending on its type, the shipping and handling conditions to which it will be subjected before it arrives at its final destination, and conditions under which it will be used or stored after it has been received; second, the degree to which it seems desirable to place parts packaging and processing in the category of a "desirable service" for merchandising purposes.

It does not seem likely that immediately after the war there will have been any marked improvement in the protection which the common transportation facilities offer for heavy machinery, or



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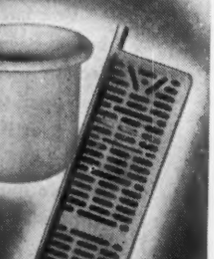

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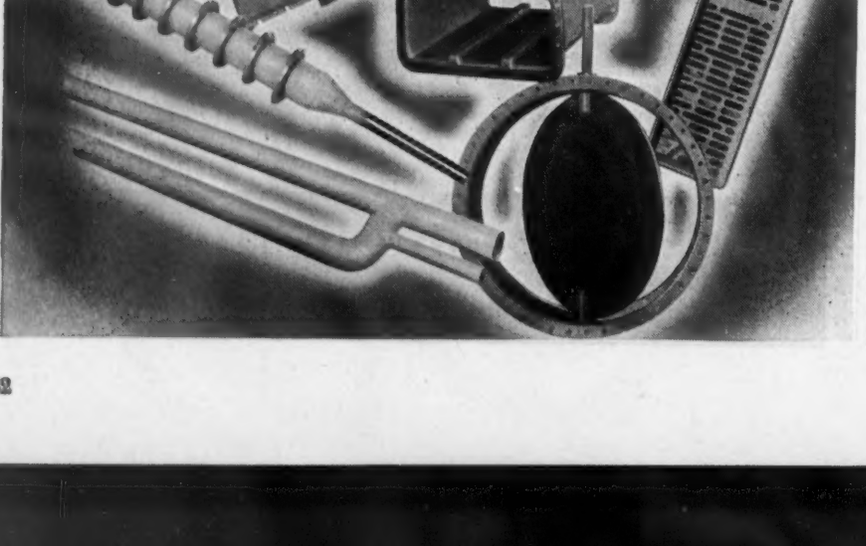


in the manner of handling by individuals, so as to allow a reduction in the amount of processing necessary prior to the war.

Many units such as the huge tractor crane shown in Fig. 9 are likely to be used in out-of-the-way places for reconstruction or for such work as shown in this view after the war, and will probably require the best possible preparation for shipment or storage that can be given them.

Exposure of export shipment to salt spray, possible salt water immersion, warm humid atmospheres or extremely cold conditions will probably continue to be the same as during military shipment, except to a somewhat lesser degree.

In many parts of the world the docking, handling and warehousing facilities which were available during peacetime have been destroyed and for much equipment, especially heavy construction equipment, the civilian needs immediately after the war are likely to be much the same as military insofar as handling and weather-proof storage is concerned.

Considering all of these factors it seems reasonable that the same general processing and preparations for export shipment, and perhaps even some domestic shipments, should be continued.

Tractor shown in Fig. 10 is processed for military export shipment. Sealed vents, exhaust, intake breathers, the wrapped starter, motor and generator, the rust inhibitor-sprayed parts and the other internal and external preparation, including crating, (which is only partly done in this illustration) is prepared to arrive at almost any destination in good condition, even though it may have the most severe handling and exposure in shipment and storage.

Developments in preservation and packaging of parts and equipment during the war have demonstrated that it is possible to preserve machines and equipment so that they can be sent to almost any part of the world by almost any means of transportation and arrive and be stored in almost any extreme of exposure and retain serviceability if properly packaged according to known procedures. They can be made weather-worthy, handlable, transportable, and storable to almost any degree which is required with a reasonable expenditure of money, materials, and time.

Heater Uses Fractional Horsepower Motor

A fractional horsepower electric motor drive unit has been designed by Electrical Engineering and Mfg. Corp., 4606 West Jefferson, Los Angeles, 16, to drive the cabin heater in the Douglas A-26 bomber. A light weight, continuous duty type, the ½-horsepower, fan cooled, 7000 revolutions per minute motor is equipped with right angle gear box and drive shaft. It has a gear ratio of 1 to 1 and overall efficiency of 70 per cent. Motor frame is No. 6220 and is suited for use in a 28-volt system. It is designed to fit in the restricted space.

Guide Aids in Solving Problem of Color Selection

A new and simple color selection guide permits persons without detailed technical understanding of color science to specify correct color shades that minimize fatigue and promote safety, according to Arco Co., Cleveland. Developed for use in industrial, commercial and institutional interiors, method enables anyone confronted with a painting job to make his own selections on a scientific basis, insuring maximum benefits obtainable through use of color.

Answers to all the usual color selection problems have been reduced to 18 short and simple rules relating directly ot colors in the company's Optonic system, including five shades of accurately measured reflection value in each of five colors—blue, green, tan, coral and gray; however, they apply to all color selection work.

First eight rules specify use of colors to compensate for deficiencies in natural and artificial light, limited by direction of window exposure and type of electric lamps used. Remaining rules guide the choice of shades for work areas, machinery and building equipment on the basis of measured contrasts and reflection value, as well as selection of more colorful combinations for corridors, cafeterias and other occasionally used employe facilities where contrast with prevailing plant colors encourages relaxation and relieves fatigue.

Booklet entitled "A Practical Guide to the Use of the Optonic Color System" is the result of extensive laboratory and field tests by company paint colorists, laboratory technicians and field service men. Rules are said to have been used successfully over a period of years in more than 250 school buildings and many large industrial plants. The 25 shades have all been selected in accordance with the Ostwald system and the Weber-Fechner law of visual intensities and can be used effectively in any combination.

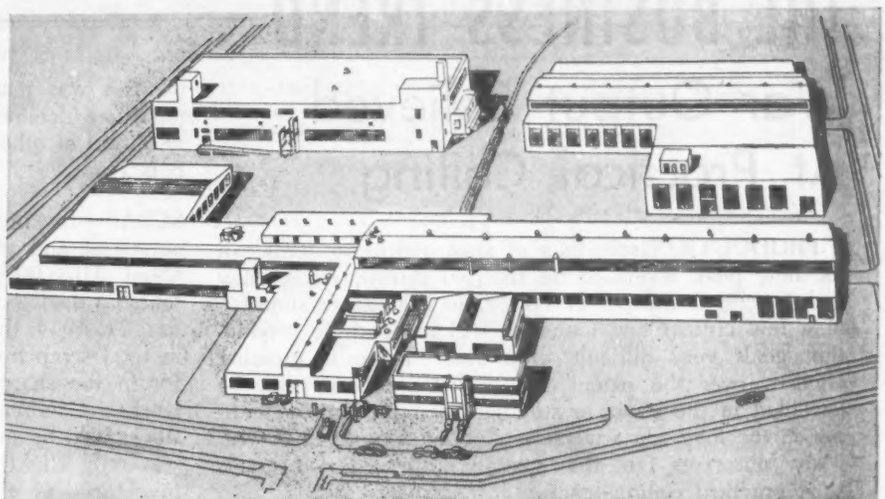
This system is said to provide colors which fortify reflection of wave lengths in which working light is deficient, and soften excessive wave lengths.

Book Discusses Flanging and Pressing

A comprehensive book on the subject of spun heads for boilers, tanks, pressure vessels and other uses is available from Lukens Steel Co., 237 Lukens building, Coatesville, Pa. This 132-page manual has more than 70 illustrations and contains much data never before published.

For the first time within one cover the equipment designer and fabricator have every major item of information essential to calculation of prices for forming heads.

A copy of "Lukens Flanging and Pressing" may be obtained by writing on your company letterhead to the nearest Lukens office or representative.



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THE BUSINESS TREND

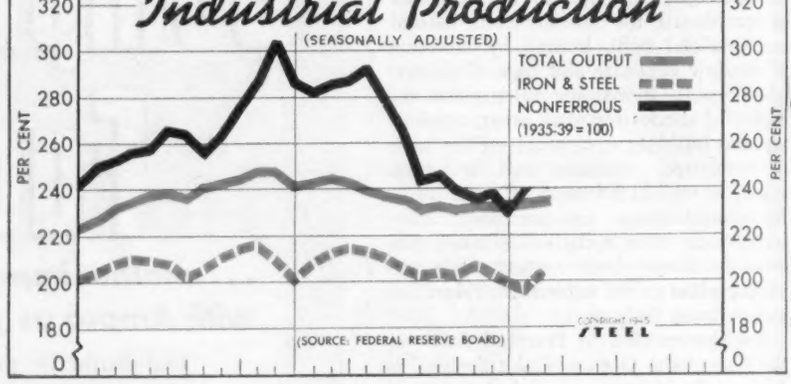
War Output Believed At Practical Ceiling

PRODUCTION schedules of most munitions items call for new peak levels to be reached during April, May and June, but manpower limitations and acute shortage of a few critical raw materials will make these production goals very difficult to attain. There is growing concern over the extent the civilian economy can be curtailed in the effort to stimulate war production without in the long run adversely affecting munitions output. Many observers feel that overall output of war goods is at practical ceiling levels.

During the latest period industrial indicators recorded little change, in contrast with the general improvement registered throughout most of March. The national steel rate held steady last week at 97 per cent, the highest level recorded to date this year. Revenue freight carloadings and crude oil production also remained practically unchanged during the latest period at the best rate of the year to date. Electric power consumption is off seasonally from the peak this year reached in mid-January, while bituminous coal production is also moderately below the high point for the year to date recorded early in February.

FRB's INDEX — Industrial production registered a slight gain during February but was well below the like 1944 month's showing, the latest Federal Reserve Board's monthly production report states. The board's seasonally adjusted production index for February stood at 235, compared with 234 in the preceding month and 244 for the like 1944 period. Output of most durable goods showed little change in February, although encouraging gains were recorded in production of explosives and small-arms ammunition. Production of minerals rose slightly in that month. Activity in the machinery and transportation equipment industries was maintained at the level of the preceding month; a decline in shipbuilding offset a slight increase in output of other munitions industries, the board's report points out.

SCRAP—Inventories of iron and steel scrap at consumers', suppliers' and producers' plants declined 6 per cent to about 5,023,000 gross tons during January, and represented a decline of 1.2 million tons from that recorded on Jan. 31, 1944, the Bureau of Mines reports. Major losses in total scrap inventories during January were accounted for in the sharp decline of 218,000 tons in consumers' stocks. Combined with this reduction was a decrease in stocks held by suppliers amounting to 101,000 tons, which was only slightly counteracted by an increase in scrap inventories at plants of producers totaling 14,000 tons.



Federal Reserve Board's Production Indexes
(1935-39 = 100)

	Total Production			Iron, Steel			Nonferrous		
	1945	1944	1943	1945	1944	1943	1945	1944	1943
January	234	243	227	197	208	204	240	281	250
February	235	244	232	203	212	208	...	285	252
March	...	242	235	...	214	210	...	286	256
April	...	239	237	...	213	209	...	292	257
May	...	237	238	...	210	208	...	279	266
June	...	235	236	...	204	201	...	264	264
July	...	231	240	...	202	204	...	243	256
August	...	232	242	...	203	210	...	245	264
September	...	231	244	...	202	214	...	239	277
October	...	232	247	...	206	215	...	236	286
November	...	232	247	...	201	209	...	239	304
December	...	232	241	...	198	200	...	229	277
Average	...	236	239	...	206	208	...	260	267

FIGURES THIS WEEK

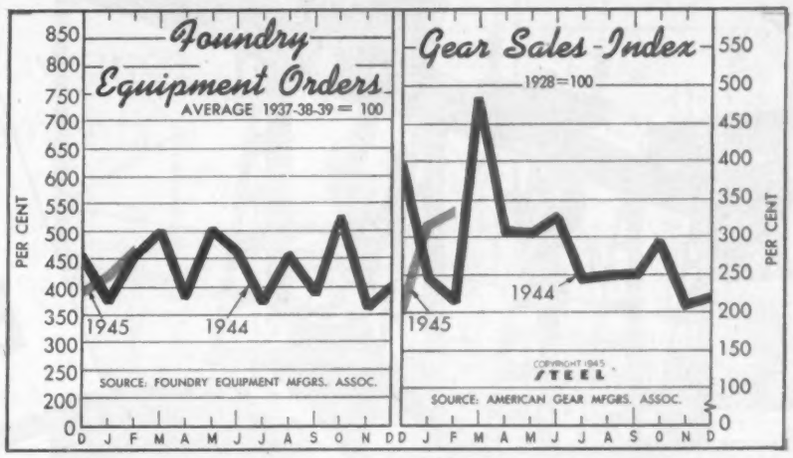
INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	97.0	97.0	96.0	99.0
Electric Power Distributed (million kilowatt hours)	4,329	4,402	4,472	4,409
Bituminous Coal Production (daily av.—1000 tons)	1,967	1,992	1,988	1,992
Petroleum Production (daily av.—1000 bbls.)	4,783	4,782	4,765	4,383
Construction Volume (ENR—unit $1,000,000)	$37.3	$23.6	$39.0	$29.4
Automobile and Truck Output (Ward's—number units)	20,335	20,480	18,545	18,085

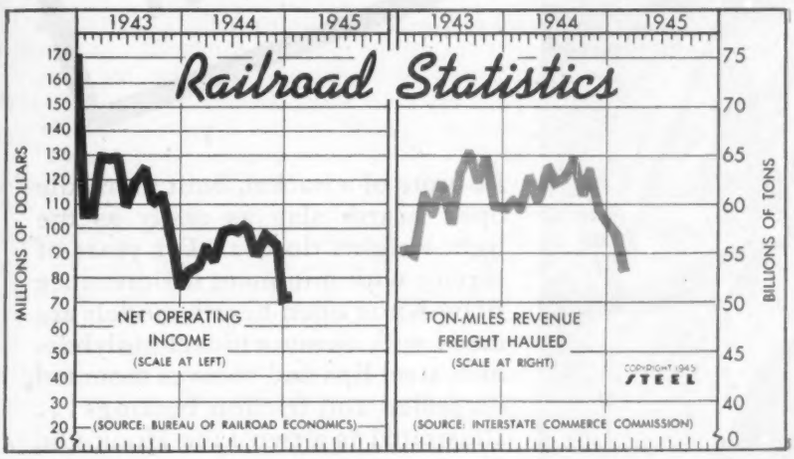
*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	830†	826	785	788
Business Failures (Dun & Bradstreet, number)	28	14	18	21
Money in Circulation (in millions of dollars)‡	$25,834	$25,836	$25,750	$21,037
Department Store Sales (change from like week a year ago)‡	+24%	+28%	+24%	+17%

†Preliminary. ‡Federal Reserve Board.

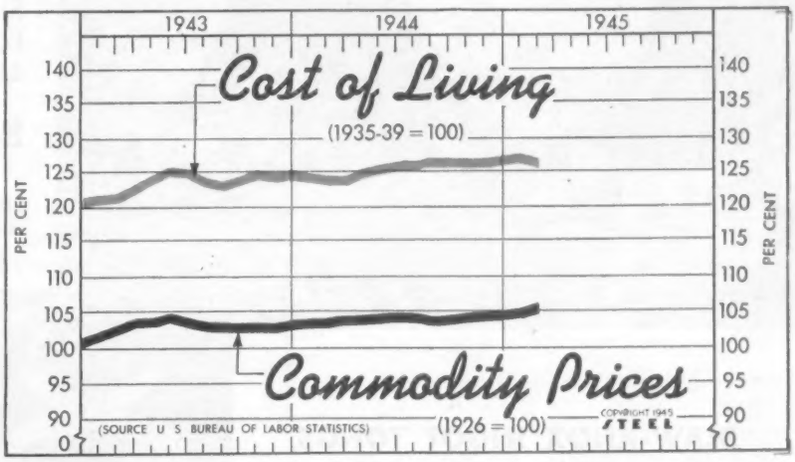
	Index of Foundry Equipment Orders — Monthly Average (1937-38-39=100)			Gear Sales — Index (1928=100)		
	1945	1944	1943	1945	1944	1943
Jan.	422.4	442.8	429.8	323	246	268
Feb.	465.3	378.3	399.5	331	214	303
Mar.	....	456.8	562.7	...	485	334
Apr.	....	385.7	362.7	...	308	240
May	....	503.9	348.9	...	305	342
June	....	466.1	413.6	...	328	401
July	....	375.8	379.4	...	242	374
Aug.	....	450.5	390.4	...	247	312
Sept.	....	388.0	346.6	...	248	320
Oct.	....	526.5	436.6	...	293	368
Nov.	....	369.5	388.0	...	209	387
Dec.	....	397.4	442.8	...	219	387
Avg.	....	426.9	440.3	...	279	336





	Statistics of Class I Railroads — Net Operating Income (millions)			Ton-Miles Revenue Freight (billions)		
	1945	1944	1943	1945	1944	1943
Jan.	$73.0	$84.9	$105.3	57.0	60.5	55.1
Feb.	....	84.5	105.8	53.0	59.3	54.4
Mar.	....	92.5	129.7	...	63.0	61.2
Apr.	....	87.7	128.7	...	60.4	59.1
May	....	98.5	129.5	...	64.0	62.1
June	....	99.8	109.0	...	62.0	58.0
July	....	98.6	127.8	...	62.8	63.7
Aug.	....	101.4	132.3	...	64.5	65.1
Sept.	....	89.1	110.3	...	61.0	62.5
Oct.	....	97.3	113.1	...	63.5	65.0
Nov.	....	91.6	96.4	...	59.4	59.9
Dec.	....	69.8	76.9	...	57.3	60.6
Ave.	....	$93.1	$113.5	...	61.5	60.6

	Wholesale Commodity Price—Cost of Living Indexes — Commodities (1926=100)			Living Costs (1935-39=100)		
	1945	1944	1943	1945	1944	1943
Jan.	104.9	103.3	101.9	127.1	124.2	120.6
Feb.	105.2	103.6	102.5	126.8	123.8	120.9
Mar.	....	103.8	103.4	....	123.8	122.8
Apr.	....	103.9	103.7	....	124.6	124.1
May	....	104.0	104.1	....	125.1	125.1
June	....	104.3	103.8	....	125.4	124.8
July	....	104.1	103.2	....	126.1	123.8
Aug.	....	103.9	103.1	....	126.4	123.2
Sept.	....	104.0	103.1	....	126.5	123.9
Oct.	....	104.1	103.0	....	126.5	124.4
Nov.	....	104.4	102.9	....	126.6	124.1
Dec.	....	104.7	103.2	....	127.0	124.4
Ave.	....	104.0	103.2	....	125.5	123.5



FINANCE

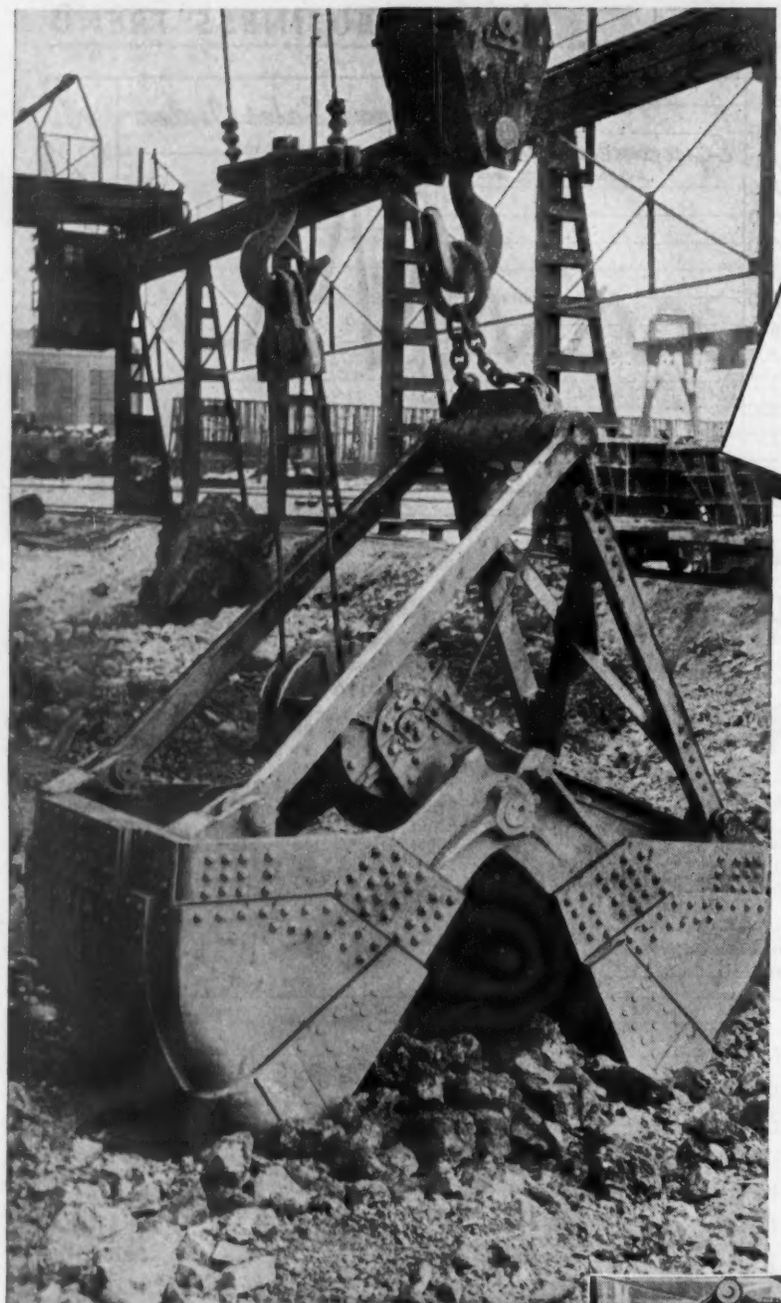
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,738	$11,261	$9,412	$9,778
Federal Gross Debt (billions)	$234.7	$234.6	$234.9	$184.5
Bond Volume, NYSE (millions)	$30.3	$43.5	$56.1	$52.6
Stocks Sales, NYSE (thousands)	4,197	5,291	8,939	4,946
Loans and Investments (millions)†	$58.1	$58.2	$58.8	$52.0
United States Gov't. Obligations Held (millions)†	$43,774	$43,799	$44.1	$38,329

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.1	105.1	104.8	103.7
Industrial Raw Materials†	116.0	116.3	115.7	114.0
Manufactured Products†	100.3	100.3	101.6	99.2

†Bureau of Labor's Index, 1926 = 100.



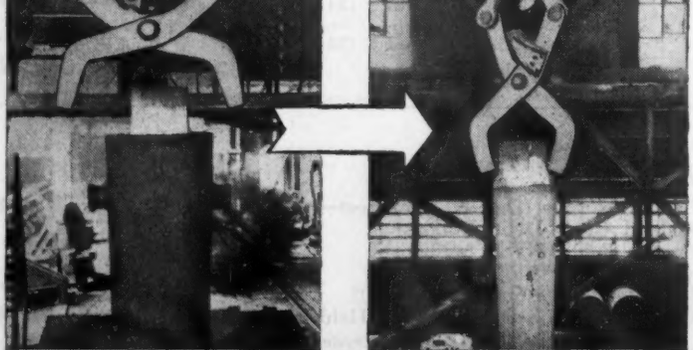
19,300 lbs. of EFFICIENCY

A brute of a bucket, built to handle open hearth slag as easily as the light-weights do coal. For years of service with minimum maintenance Blaw-Knox open-hearth models are made with chrome nickel molybdenum steel lips and sheaves mounted on sealed anti-friction bearings... Illustrated is a two Line Hook-On, Size No. 735-01 rated 3 cu. yds.... For complete data write for Catalog 2002.

BLAW-KNOX DIVISION
of Blaw-Knox Company
2002 FARMERS BANK BLDG., PITTSBURGH, PA.
New York • Chicago • Philadelphia • Birmingham • Washington
Representatives in Principal Cities

BLAW-KNOX INGOT TONGS

Completely automatic in pick-ups and releases. No attendant required. Made in a number of sizes and styles capable of handling ingots up to 18,000 lbs.



BLAW-KNOX CLAMSHELL BUCKETS

WPB Cuts Repair Allowance To Help War Requirements

Second quarter maintenance reduced . . . Except for plates pressure is unabated . . . Lake ore season opened . . . Russian manganese on way

INDICATION of critical need for war steel in spite of military successes in Europe and the Pacific is found in action by the War Production Board in reducing allotments for second quarter on maintenance and repair tonnage.

The regulation limits transportation systems to 80 per cent of the quantity permitted in fourth quarter last year, power, water, gas and central heating systems are limited to 20 per cent of total purchases during 1944. Such purchases of those covered by regulations 5 and 5A, mining companies covered by P56 and government services covered by P141 are limited to 20 per cent of purchases in second quarter last year.

Pressure for sheets appears as strong as ever and there has been a further increase in demand for alloy sheets and bars. Although there are indications of easing in light arms and ammunition programs hot and cold-drawn carbon bars continue tight. Hot-top quality bars for heavy shells are sold well into next year. Shapes are holding their own, with producers generally booked into August. Pipe and tubular backlogs are expanding and all major products except plates are tight, with prospects for fairly sustained plate production for the remainder of second quarter.

Adjustments in second quarter schedules are being made in an effort to work in as many of the more pressing needs as possible. To this end the Army has released 34,000 tons of carbon steel to allow production to start on 2000 additional box cars, facilitating a program of 20,000 scheduled for completion by the end of September. Shortage of this type of car is acute.

Pig iron continues tight and one idle stack is about to be relighted in the Youngstown district. An eastern Pennsylvania stack down for relining is expected to be relighted sooner than had been thought, repairs being lighter than estimated. Consumption of merchant iron is heavy but is limited by lack of labor in foundries, while inquiry for castings is much greater than can be accepted.

Movement of Lake Superior iron ore by lake has started, the first cargo from Escanaba, Mich., being unloaded at Cleveland April 5 and a large fleet being en route to the head of the lakes for additional cargoes.

Arrival in this country soon of two cargoes of Russian manganese ore, first to pass the Dardanelles since early in the war, heralds the expected movement of possibly 300,000 tons within the next 12 months.

While steelmaking operations held steady in more than half the leading districts slight declines in four areas caused the estimated national production rate to recede ½-point to 96½ per cent of capacity. Cleveland was the only district to show a gain, rising from 90 to 93½ per cent of capacity. Chicago lost ½-point to 101 per cent, Pittsburgh ½-point to 91½, Buffalo 1½ points to 90½ and Detroit 5 points to 90. Unchanged rates were as follows: Cincinnati 86; Youngstown 93; New England 90; Birmingham 95; Wheeling 93½; St. Louis 80; eastern Pennsylvania 95.

Scrap supply continues sufficient to maintain a high rate of steelmaking but there is no surplus and reserves are reduced by inroads during the difficult time last winter. Opening of Great Lakes navigation promises considerable tonnage from Lake Superior ports, vessels already being on their way north to load. Tonnage from the Pacific Coast continues to move to the Midwest. Prices, except for borings and turnings, are at ceilings and strong. Heavy melting steel scrap is in demand to balance large use of lighter grades, which are more plentiful. Cast scrap shows no improvement in supply.

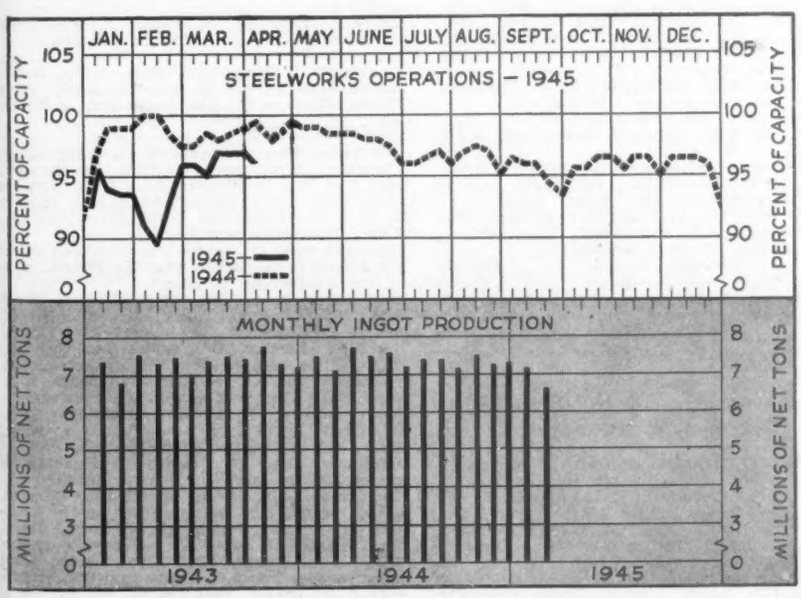
Average composite prices of steel and iron products continue at levels of the past several months, finished steel composite $57.55, semifinished steel $36, steelmaking pig iron $24.03 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended April 7	Change	Same Week 1944	Same Week 1943
Pittsburgh	91.5	−0.5	94	100
Chicago	101	−0.5	101	100.5
Eastern Pa.	95	None	95	95
Youngstown	93	None	95	98
Wheeling	93.5	None	100	89
Cleveland	93.5	+3.5	92.5	96
Buffalo	90.5	−1.5	90.5	90.5
Birmingham	95	None	95	100
New England	90	None	87	95
Cincinnati	86	None	91	85
St. Louis	80	None	80	93
Detroit	90	−5	87	94
Estimated National rate	96.5	−0.5	*99.5	*99.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	April 7	Mar. 31	Mar. 24	One Month Ago Mar., 1945	Three Months Ago Jan., 1945	One Year Ago Apr., 1944	Five Years Ago Apr., 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$57.35	$56.73	$56.08
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	April 7 1945	Mar. 1945	Jan. 1945	Apr. 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.20	2.15	2.10
Plates, Philadelphia	2.25	2.25	2.225	2.15
Plates, Chicago	2.20	2.20	2.18	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.15	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.65	3.61	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.18	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.65	3.61	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	2.70	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Finished Material	April 7 1945	Mar. 1945	Jan. 1945	Apr. 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$25.19	$25.19
Basic, Valley	24.50	24.50	23.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	24.69	24.69
No. 2 foundry, Chicago	25.00	25.00	24.00	24.00
Southern No. 2, Birmingham	21.38	21.38	20.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	24.30	24.30
No. 2 fdry., del. Phila.	26.34	26.34	25.84	25.84
Malleable, valley	25.00	25.00	24.00	24.00
Malleable, Chicago	25.00	25.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$19.75	$20.00
Heavy Melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill; Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{9}{32}$ in. inclusive, per 100 lbs., $2. Do., over $\frac{9}{32}$—$\frac{11}{32}$-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4800	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6 40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Josiyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; **Pacific** ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on iap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	½-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.37
2⅞"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅜ and ⅝ x 6-in. and shorter ... 63½ off
Do., ⅝ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

	U.S.S.	S.A.E.
Semifinished hex		
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
½-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
By-Product Foundry	
Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.85

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[11]	4.715	6.012[22]	6.012[22]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[15]	4.872[26]	4.072[21]	4.772	5.816[26]	5.860[26]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[26]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.896[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[26]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[26]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[13]	4.40[14]	3.75[21]	4.669	5.60[22]	5.75[22]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[14]	3.65[21]	4.35	5.60[22]	5.75[22]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[1]	5.027[13]	4.40[24]	3.75[21]	4.45[21]	5.60[22]	5.65[22]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[13]	4.500[24]	3.800[21]	4.659	5.93[22]	5.93[22]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[19]	5.443[24]	4.443[19]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[15]	4.20[24]	3.75[21]	4.65	5.75[22]	5.85[22]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[15]	4.337[24]	3.887[21]	4.787	5.987[22]	6.087[22]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[15]	4.568[24]	3.98[21]	4.78	6.08[22]	6.18[22]
St. Paul	3.76[3]	3.81[3]	3.91[3]	5.41[3]	3.61[3]	3.86[3]	3.86[3]	5.407[15]	4.46[24]	4.361[21]	5.102	6.09[22]	6.19[22]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[22]	6.231[22]
Memphis, Tenn.	4.015[3]	4.065[3]	4.165[3]	5.78[3]	4.065[3]	4.215[3]	4.215[3]	5.415[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[20]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.73[3]	4.25[3]	4.35[3]	5.50[3]	3.863[3]	4.313[3]	4.313[3]	5.463[15]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[13]	7.20[3]	5.583[20]	5.613	5.85[22]	5.95[22]
San Francisco	4.15[7]	4.85[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[15]	5.333[21]	7.333	8.304[25]	8.404[25]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[15]	5.583[15]	.....	.....	.....
Tacoma	4.35[3]	4.45[3]	4.85[3]	6.50[3]	4.75[3]	4.25[3]	5.45[3]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[22]
Seattle	4.35[3]	4.45[3]	4.85[3]	6.50[3]	4.75[3]	4.25[3]	5.45[3]	6.10[15]	7.60[15]	5.783[21]	.....	.....	8.00[22]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles. [19]—100 to 749 pounds; [20]300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10 .15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del	2715	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. ‡For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases	61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight alloyed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for silicon, bulk, c.l., 5.80c, 2000 lbs. to 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder; spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N.Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	14.00
Short Shovel, Turnings	16.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	9.00- 9.50
Mix. Borings, Sht. Turn	9.00- 9.50
Short Shovel Turnings	10.00-10.50
Cast Iron Borings	9.00- 9.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	13.00
Short Shovel. Turnings	15.00
Mixed Borings, Turn.	13.00
Cast Iron Borings	14.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	9.00- 9.50
Cast Iron Borings	10.00-10.50
Short Turnings	11.00-11.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	7.00- 8.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barreling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $161 to $165 in smaller quantities

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.0uc, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

THERE'S MORE TO A SHACKLE THAN SIZE AND TYPE

• It takes more engineering than you might think to make really good shackles. We know, because we've been making good shackles for years. And, every once in a while, we find a way to make them even better.

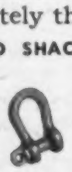
ACCO SHACKLES are forged from fine grain steel which has superior forging qualities—a steel which can be depended upon for uniform product with uniform tensile strength.

All ACCO SHACKLES are forged in solid dies. Most sizes are drop-forged already bent. This also insures greater uniformity.

Every shackle is rigidly inspected. Special lights enable inspectors to see even the smallest defect. It is almost impossible for a faulty shackle to get by ACCO inspectors.

In shackles with a screw pin, the pin is drop-forged and accurately threaded for continued easy operation.

ACCO SHACKLES, are made to do their job—better.



ACCO SHACKLES are made in both chain and anchor type—of material from ¼ inch to 2 inches—with round pin or screw pin—finished self-colored, blacked or galvanized—shipped in kegs or barrels, depending on quantity.

ACCO

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE · BRIDGEPORT

TRADE MARK

In Business for Your Safety

Sheets, Strip . . .

Sheet & Strip Prices, Page 168

Backlogs of sheet mills continue to expand and deliveries are pushed further ahead, most producers quoting late November and December, with occasional promises for October. Cut in allocation of hot-rolled pickled sheets for jobbers has not affected loads on sheet mills as gaps in schedules are filled immediately by WPB orders for pressing needs.

New York—Sheet backlogs continue to expand, with additional producers now out of the market entirely for this year on hot-rolled pickled and cold-rolled sheets. Some tonnage can still be had for late November and December, however, and in the case of plain hot-rolled sheets one or two sellers, it appears, can still offer some tonnage in October.

Tonnagewise, sheet producers are little affected by the cut of 50 per cent in second quarter in hot-rolled pickled sheet tonnage for jobbers. This is due to two reasons, one being that directives are promptly issued by WPB to fill gaps and the other being that jobbers may, if they so desire, take in plain hot-rolled sheets, to the extent of their cut in hot-rolled pickled.

A spurt continues in electrical sheet activities. Certain producers are now sold out for the year on all grades and others practically so. On low silicon grades some offerings now fall late in February. Stainless steel specifications likewise are being increased, with some producers who less than a month ago were able to take orders for May, now quoting August. In fact, at least one seller is now reported quoting September.

Recent cancellations of orders for sheets for practice bombs have been offset in some cases by orders for steel for ammunition boxes.

Boston — While aggregate orders for narrow cold-rolled strip are down slightly, the volume of tonnage in backlogs affected by cutback revisions is relatively small. However, reduction in small ammunition programs is reflected in changes in requirements for link steel. The few gaps appearing in mill schedules are quickly filled. High-carbon schedules are about closed for October and some current bookings are for November with alloys available in late fourth quarter. Order volume is nearer shipments.

Cincinnati — Better transportation recently has enabled district mills to reduce piled sheet stocks, following a rail embargo and dislocation of shipping during high water. Demand for sheets shows slight drop. Order books are virtually filled for the rest of the year, and some tonnage has been offered for next year. The overload, reflected in a heavy carryover from March, indicates need for revision of schedules. Andrews Steel Co., Newport, Ky., is back at capacity output after flood interruption.

Philadelphia — Hot-rolled pickled sheets are in particularly urgent demand and deliveries on cold-rolled sheets in general are equally extended. Tonnage can be had in November but most offerings fall later on both products. Some producers are out of the market for this year. One unit quotes cold-rolled for shipment in April, 1946. On plain hot-rolled sheets October is offered by some leading producers. Stainless sheets are offered for August and September ship-

ment. On galvanized one mill has limited specification available in August and tonnage has been picked up in other quarters recently for September. Some producers are booked solidly into February.

Chicago — Cancellations fail to reduce sheet overload and government procurement agencies have substantial requirements they are unable to get on mill books. Ammunition container program has been projected over balance of year, and in the case of one sheetmaker has resulted in orders for over 10,000 tons of sheets from contractors in one state alone. A manufacturer of landing mat has had its contract reinstated and its April requirement of 2000 tons of sheets will be obtained by directive against a local mill; source of remainder of second quarter needs is not determined. Also indicative of extended deliveries is the fact a mill has received in one week 12,000 tons of landing mat sheets for delivery in first quarter, 1946. Hot-rolled sheets are in November delivery, cold-rolled in December. Strip mill sheets, hot-rolled pickled, and galvanized sheets are in January. Likewise, narrow and wide strip, hot-rolled strip and hot-rolled pickled sheets are in January.

Pittsburgh — Buying continues heavy and the carryover from March on virtually all mills was more than 100 per cent of capacity. New directives are still being issued and some sources here expect a decline in commitments until some substantial percentage of overload directives can be worked off. Practically no sheet tonnage is available for this year in cold-rolled or galvanized. A few mills have indicated that they are able to book tonnage in certain items by the end of third quarter. In general hand mills are in better shape than continuous mills.

Cleveland — Some decline in demand for sheets and strip has developed, following heavy ordering in recent months and more extensive screening of new orders. Most sellers now quote hot-rolled pickled sheets for delivery in November and December; cold-rolled is available from October into next year. In most instances galvanized material is not available until next year. Some steel interests are producing a limited tonnage of galvanized sheets on electrolytic tin lines. Deliveries on stainless are extended through July. Carryover sheet tonnage into April represented over 30 days' output with some producers.

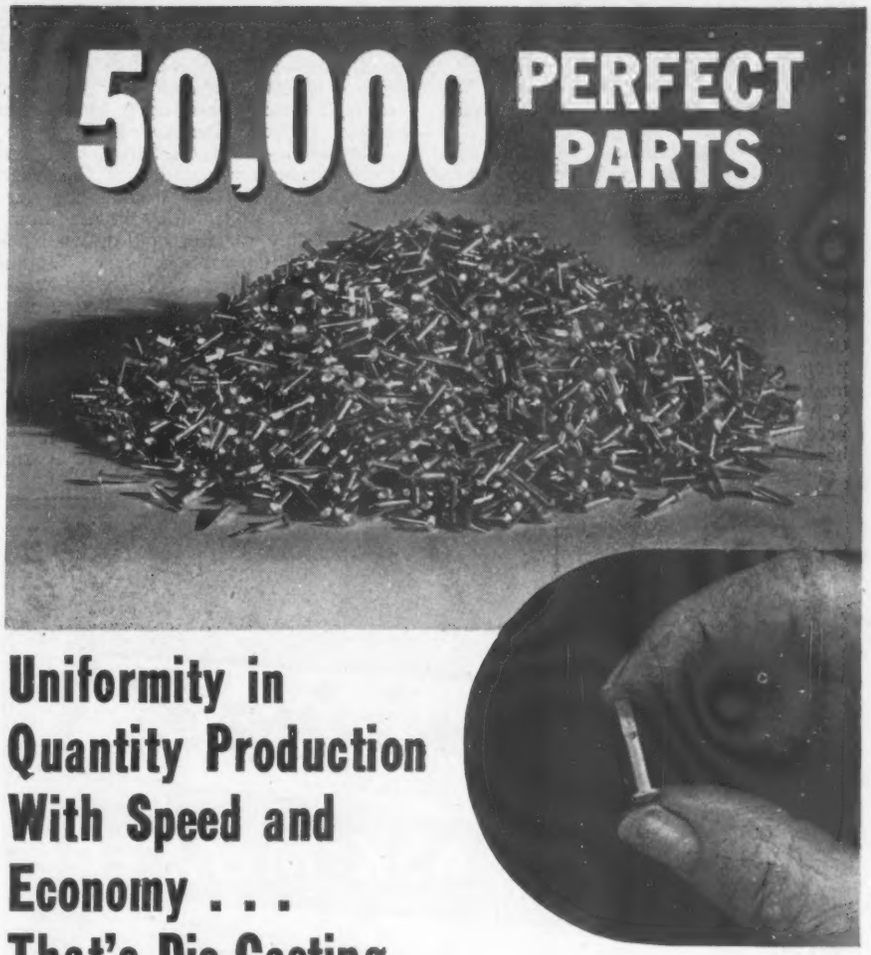
St. Louis — Pressure for sheets and strip continues highest for the war period and mills are booked to the end of the year. Labor is slightly better but many mills work men seven days a week. Deferred plant maintenance cuts into output. Expectation that the Navy cutback would release some steel to sheet mills has not materialized.

Steel Bars . . .

Bar Prices, Page 168

Barmakers are sold far ahead, common carbon bars as far as September, with quality bars and electric furnace alloy bars into February. Shell steel requirements are heavy and absorb much production, crowding bars for other purposes into the background.

Philadelphia — In sharp contrast with last year and early this year, alloy bar shipments now are quoted eight to nine



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months ahead, exceeding schedules on plain carbon bars in some instances, although still behind hot-top quality bars on which most sellers now are booked well into next year, February and March in some instances.

Chicago — Expanding demand for shell steel continues to crowd production of bars, and most steelmakers experience difficulty in fulfilling production directives on bars and shell billets. The matter is essentially one of insufficient hot-topping capacity. As shell steel requirements grow, tonnage makeup must come from quality bars, rails and structurals. Farm equipment industry expects cutback in second quarter allotment but for the majority their production schedules will be little affected because considerable inventories are on hand. Some decline is noted in demand for heavy forgings. Regular carbon bars are in September delivery, and quality bars have advanced to next February. Electric furnace alloy bars also are in February, but open hearth can be had in November and December.

Cleveland — Most sellers are booked solidly through remainder of this year, except on some small carbon bar sizes and electric furnace alloy items. Some mills are able to offer cold-drawn stock for late fourth quarter delivery. Output at Republic's Corrigan McKinney works 12 and 18-inch mill established a new record during March, and a still higher daily average production rate is indicated for this month. Most shipments continue to be for heavy shell and rocket programs, and further expansion in requirements from these two sources is scheduled. Directive tonnage represents a substantially smaller proportion than during February and early March, reflecting rigid screening of requirements by WPB.

Pittsburgh — Despite the fact that no changes have occurred in the bar market, there is a feeling that the situation will ease soon. Part of this is indirectly due to a reduction in the projected shell program with suspension of some shell plants which were under contract but not yet in operation. Current order books reflect capacity operation on present basis through this year. There are a few gaps in fourth quarter, principally on smaller sizes.

Boston — Demand for alloy and cold-drawn carbon bars is fair but in the aggregate buying is lower. Extended mill deliveries continue to divert orders to warehouses, some of them large for one size which normally would go to mills. Deliveries from jobbers frequently are two months ahead of mills. This drain on warehouse inventory and load tonnage on order is tightening supply. There are few revisions in bar orders already in, although a small tonnage for hand tools and borderline essential goods is affected. Extended deliveries and forward coverage to the extent of allotments contribute to slackening in orders and a substantial part of buying centers about delivery, which means shopping among warehouses.

St. Louis — Pressure for steel bars is greatest since the beginning of the war and no letdown is in sight. Many eastern mills seek to shift some of their load to mills here. Deliveries are extended three to four months.

Steel Plates . . .

Plate Prices, Page 169

Reduction of proposed Navy shipbuilding has had considerable effect on the steel plate situation, with cancellation of such tonnages as had been placed and also by smaller potential demand. Steel thus released is being made available for other war needs. Deliveries have improved somewhat though June is earliest with most producers.

Pittsburgh — Navy program reduction caused an estimated reduction of steel requirements amounting to 70,000 tons, principally plate. Although it is possible that all ships now booked by the yards will be produced, the volume is down considerably. Load directives, for example, are expected to drop in second half to less than 50 per cent of current commitments. There seems to be reasonable doubt on some of the Maritime Commission tonnage now placed, but most of these bottoms will be completed, as will the balance of Navy ships. Plate operations continue at full speed on the mills with no more than normal tonnage coming off continuous strip mills.

Cleveland — Cutback of the Navy program has had little effect on rolling schedules on mills in this area, with sellers booked solidly through June. Output of plates last month reached the highest level since March, 1944, and this pace is expected to be maintained due to heavy pressure for deliveries. Overall new bookings continue to taper.

Philadelphia — Gaps in April plate rollings, as a result of the Navy cutback, have been filled promptly, although some mills have a little capacity available for May. Others are booked into June, at least two are fully scheduled into July and one producer of universal

plates quotes August.

Boston — Canceled Navy contracts involve about 35,000 tons of steel, largely plates, in the New England district. Part of this tonnage for destroyers, including considerable high tensile, had been tentatively placed for delivery starting in June. All major yards building combat ships are affected; three additional destroyers of 2200 tons each transferred from New Jersey to Bath, Me., are included. Award of contracts for 12 coastal 230-foot tankers, to New England Shipbuilding Corp., South Portland, Me., fills only slight part in total plate tonnage lopped off. Mill schedules are easier and deliveries have improved in some instances, although June is the earliest with most. Backlog tonnage for this area is down sharply. Floor plates are also in June; backlogs are lower and pressure for shipment is easing.

Return to competitive bids and fixed price contracts by the Maritime Commission is marked by the award of 24 coastal 230-foot tankers; Portland yard bid of $595,168 each for 12, is based on the commission procuring certain materials and equipment, last tanker to be delivered in 266 days.

Chicago — Cancellation of naval construction is having little repercussion here, for most plate load is for other than ship construction. Possibly, however, some of the plate tonnage now on books may be transferred to other districts having capacity less fully occupied. One platemaker has had its Maritime Commission reservation for August canceled. Although producers in other districts are reported to have open space in May and June, narrow sheared plates here are in September delivery, and wide in July. Small universal plates stand at July and large at October.

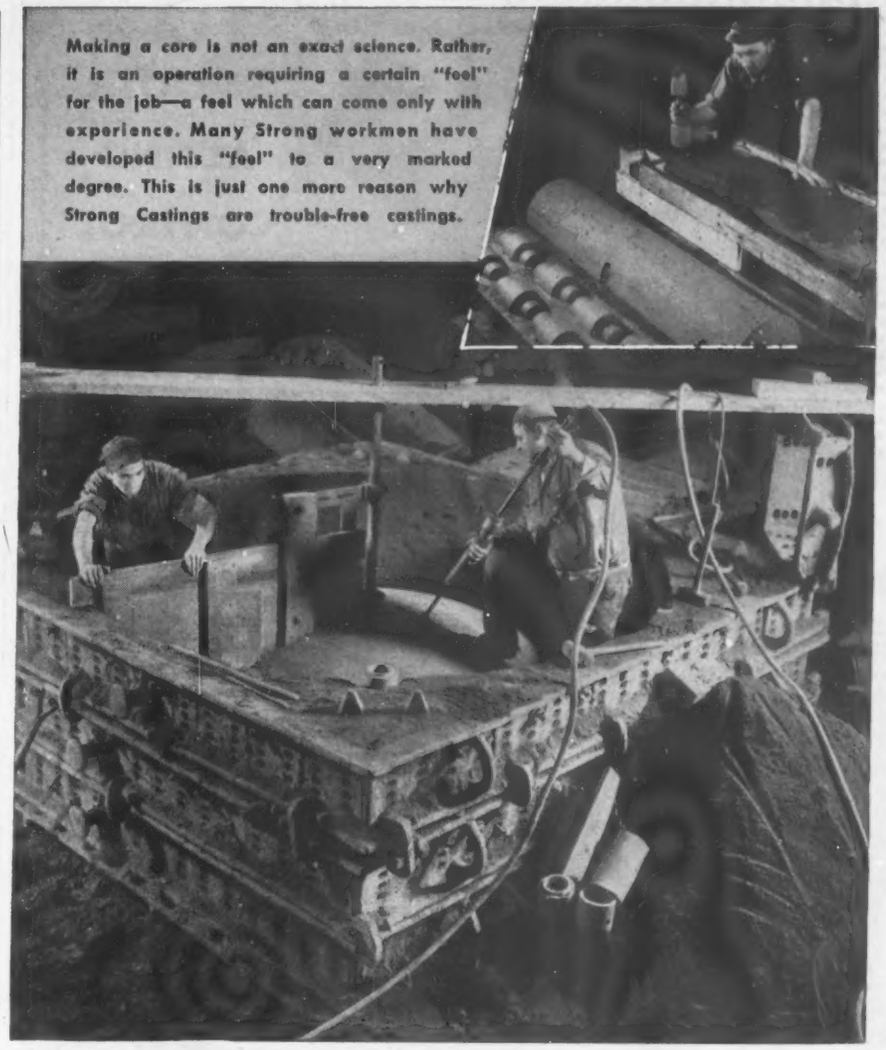
St. Louis — Plate production in this area is booked to June. Labor shortage is easing somewhat and directives are fewer, improving schedules. Much capacity here is devoted to the Maritime Commission program, with no indication of cutbacks similar to those in the Navy program.

Tubular Goods . . .

Tubular Goods Prices, Page 169

Boston — Industrial demand for steel pipe and tubular products is spotty; cold-drawn in medium and larger sizes is extended into next year with some mills and seamless over four-inch required for earlier delivery against shell programs is scheduled with difficulty. High ratio demand for quality hot-topped steel continues a choke point for tubular products. Practically all alloy ingots are being poured into hot-topped molds and about one-third of all carbon. Steel pipe deliveries to utilities for maintenance and repair for second quarter have been reduced to 20 per cent of all 1944 shipments. Shipyard requirements are declining, but most shops building fire protection equipment maintain rate of buying. Small galvanized for prompt delivery for prefabricated houses abroad is more active. Special tubing is up for sale as surplus. One lot located in Bridgeport, Conn., district includes 7,000,000 feet of cold-drawn copper-plated S.A.E. 1010, 0.248 o.d. x .128 i.d. in lengths of 10 to 12 feet. Tubing was produced by Bundy Tubing Co., Detroit, for bullet cores, made surplus by revised plans.

Cleveland — In effort to conserve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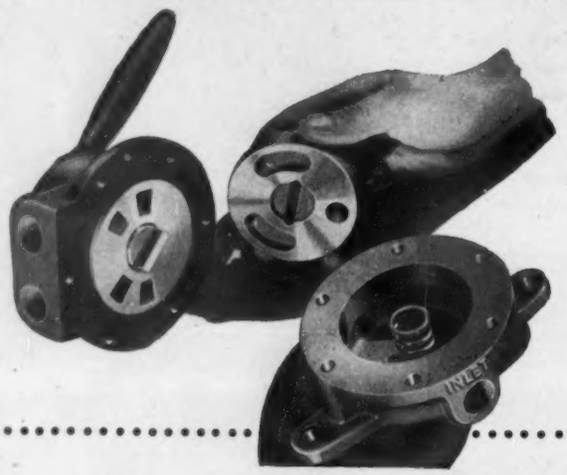

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steel, oil operators are reclaiming and returning to service large quantities of used and badly corroded oil-field pipe normally sold as scrap. By lining the old pipe with cement materials resistant to corrosive fluids, oil operators are again able to use the pipe and some even have been able to expand oil-producing operations at lower pipe cost. Much of the salvaged pipe is used for water-flooding in secondary recovery projects, brine disposal systems and oil-gathering lines.

Wire . . .

Wire Prices, Page 169

New York — Revisions in wire mill backlogs affecting nearby schedules are slight. Cutbacks for most part are small and there are none in the higher tonnage programs, produced under continuing directives. Orders continue in excess of shipments, notably for fine wire specialties. Depending on grade, size and specification and involving processing time, deliveries cover a wide range, but most specialties are in third quarter and beyond. Most producers believe backlogs will be subject to a major reshuffling soon, due to cutbacks and program changes, though there is no official substantiation. Rod supplies with most nonintegrated mills in the East are improved and finishing operations are directed toward expediting war tonnage involving this semifinished steel before drastic revisions appear.

Boston — So extended are deliveries on some highly processed specialties, small lot consumers are confronted with shortages before shipments can be made in schedule sequence; not much of this type of steel is available from warehouses and appeals to other fabricators using these grades for a small share under priority allotments to tide them over are reported. Clock spring steel is one such grade. Deliveries quoted on an outstanding inquiry for magnet wire range from shipments starting in eight weeks on part to third quarter and even fourth on other specifications. While one Worcester mill named April delivery on 856,960 square feet of poultry netting for the Navy, others quote June, f.o.b. Coil and weldless chain in some sizes is in June, but extends well into third quarter on others. Wire netting contract mentioned above went to G. F. Wright Steel & Wire Co., Worcester.

Tin Plate . . .

Tin Plate Prices, Page 169

Pittsburgh — The approach of V-E Day is probably the most significant factor in tin plate at the moment. Most sources here believe there will be a substantial increase in volume of tonnage for electrolytic tin plate after the fall of Germany. This is probably based on an anticipated easing in manpower which will permit canmakers to accept a larger volume of general line can business, now available and permissible, but which cannot be produced under present conditions. Much of this material is expected to be in the 0.25-pound coating. Current operations continue unchanged with electrolytic operations between 40 and 50 per cent of capacity and the output of cold-reduced strip for tinning at about 80 per cent of capacity.

Chicago — Improved box car supply enables producers to ship current production and also reduce accumulations stored during recent car scarcity. Deliv-

eries on new business are in August or later.

Rails, Cars . . .

Track Material Prices, Page 169

New York — Domestic freight car awards in March surpassed the February total. According to preliminary estimates, bookings involved 2500 freight cars, compared with 1750 in the preceding month. On the other hand, export orders were off, the only outstanding contract involving 1500 cars for the National Railways of Mexico, while in February export bookings were featured by 5665 cars for Russia. Current car buying is light.

Structural Shapes . . .

Structural Shape Prices, Page 169

Cleveland—Pending structural awards involve considerable tonnage, with a number of plant and equipment expansion projects awaiting WPB approval and a substantial number of jobs for the U. S. Engineer's Office in northern Ohio soon to be placed. Hercules Motor Co. is seeking $1.5 million for plant addition and equipment to its Canton, O., plant. Similar approval is sought by Jack & Heintz Inc., involving $2 million for remodeling and equipping the former National Carbon Co.'s plant on Berea road, Cleveland. Additional plant expansion at Chase Brass & Copper Co.'s Euclid, O., plant is expected to come out for bids shortly; American Bridge Co. recently was awarded 1000 tons for expansion of the same plant. No award has yet been made on Goodrich Tire & Rubber Co.'s new Brecksville, O., plant, involving about 800 tons. Local structural fabricators have 30 to 40-day order backlogs. Mill deliveries on standard shapes are extended into July.

Boston — Structural fabricators have quoted on hangar subcontracts let by Utica Structural Steel Co., a New York shop having 40 units and the Luria interests a like number. Steel orders are in with mills for August-September delivery at 2.10c base, subject to price prevailing at time of shipment. Nearing completion of the few ship subcontracts remaining, notably for the Providence, R. I., yard, shop operations are slower, with backlogs at the lowest point since before the war. Tanker requirements approximate 1800 tons; less than one-third has been placed. Buying by warehouses is centered mainly in larger stores; smaller jobbers lack quotas for shape volume. Deliveries on some sizes in July are possible, but more volume is scheduled for August.

Chicago — Inquiry for structural steel is somewhat heavier, and several jobs already bid are awaiting award. Heavy tonnages of shapes are going into military bridges. Award is expected momentarily on award by U. S. Engineers, Columbus, O., on 11,712 treadway bridges requiring 15,000 tons of shapes. Both large and small structurals can be placed with mills for August delivery.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 169

Pittsburgh — A fair tonnage of unplaced business remains, much of which will probably wind up in rail mills. While most billet mills are restricted by directives to a relatively small tonnage for second quarter, rail mills are limited only by ability to obtain rerolling rails. While such rails are in short supply at the moment, the anticipated volume is such that a part of current unplaced reinforcing bar tonnage may be accepted by rail mills.

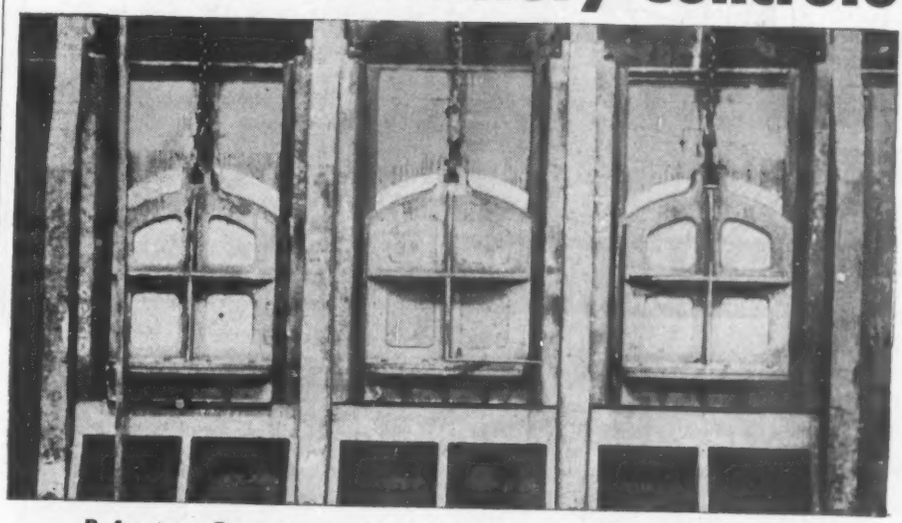
Pig Iron . . .

Pig Iron Prices, Page 171

Pig iron melters continue to press for delivery on contracts, though better movement continues as railroads offer better service. Melt appears heavy to the extent allowed by manpower. Many consumers still are well below the 30-day inventory allowed and seek to build reserves. With an eastern blast furnace down for repairs other suppliers are called on to make up the deficiency, adding to their burden.

Boston — Pig iron consumers increasing melt slightly, and in some cases seeking tonnage from new sources, experience difficulty in placing all iron wanted for this quarter. Deliveries are more nearly normal, but with furnaces dependent on current production, numerous melters are still below the 30-day inventory limit. One steelworks, having taken the last basic available at the Everett furnace, is currently comfortable as to inventory, but from now on will be dependent on rail shipments from Buffalo. Stretching of reserve held by the district furnace as far as possible contributes to broadening base of supply. Valve foundries will not be immediately affected by recent Navy

How One Forge Shop Uses Refractory Concrete



Refractory Concrete used for lining center door and for arches over all doors of this forge furnace. A. Finkl & Sons, Chicago, have been using Refractory Concrete for the past twelve years.

100% war production by this plant prevents taking pictures of recent installations. But here is one of their early Refractory Concrete jobs that led to steadily increasing use of this jointless, cast-in-place refractory during the past twelve years.

Another example: Big billets are heated in Finkl's press forge furnaces. The doors often rest on top of the billets. Flame impingement burns off the bottom of the door casting. A lining made up of small pieces doesn't last long, because the pieces drop out. The one-piece Refractory Concrete lining stays where it belongs, even when the bottom of the frame is gone. The frame can be saved by bolting on a new bottom-plate.

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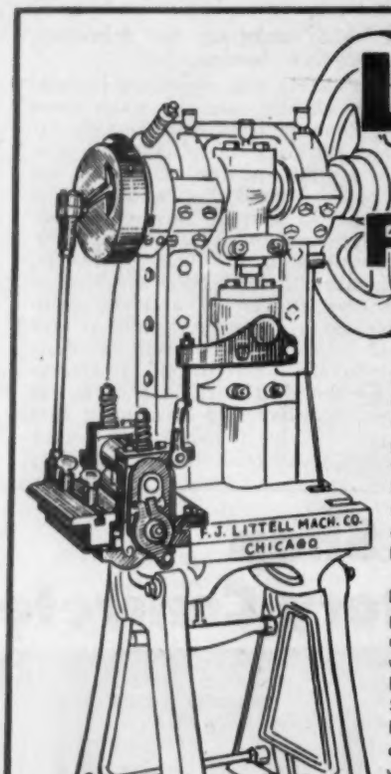

At left—Standard Style "M" Littell Roll Feed, equipped with a 3-roll Straightener, mounted on left-hand side of an O.B.I. press, feeding left to right. *Below*—same unit, including Littell Automatic Centering Reel.

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ship cancellations; war production backlogs are heavy and a large civilian demand has backed up while new orders are appearing for waterworks in devastated areas abroad, including Manila.

New York — The foundry melt in this district appears well sustained on the basis of coke shipments. However, it is pointed out that these may not be quite the criterion they are normally as there is a disposition on the part of foundry buyers to lay in as much coke as possible in view of the possibility of labor disturbances in the coal fields.

With one eastern blast furnace forced down recently for repairs, Buffalo and others inland are being called upon for heavier shipments. This is another reason for believing that little Buffalo iron will be shipped into this district by barge canal over the next several weeks. It had been believed that pressure for iron would cause consumers to require shipments by rail for some time, and now there is this further pressure.

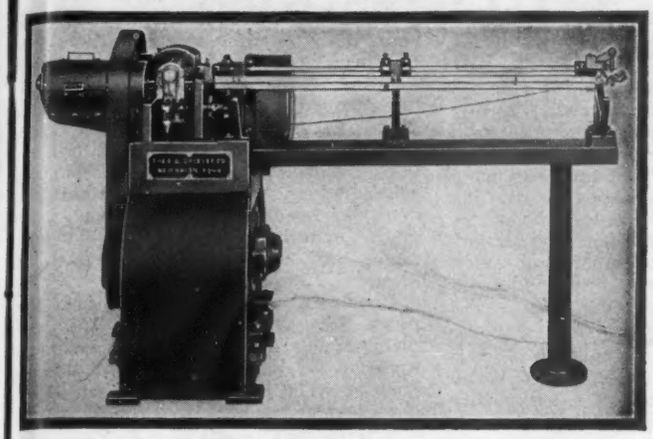
Buffalo — Pig iron producers here have no inventory and are not storing iron near tidewater, which usually is done, as demand requires immediate shipment to meet needs. Little use is expected to be made of the barge canal early this season as two weeks are required for delivery to the East and railroad transportation is much faster. Slight easing in pressure is noted in some cases, attributed to lack of workers and also to some melters having reached the 30-day inventory limit. Plenty of castings business is offered and some foundries are subletting work to others.

Philadelphia — From present indications the No. 2 stack at Swedeland, Pa., will not require complete relining and may be able to resume late this month. Meanwhile the gap in supply here is being met by other furnaces, some basic being supplied by producers who do not normally ship this grade into this district. To help the general shortage in pig iron the Struthers, O., furnace is scheduled to be relighted about May 1.

Chicago — Insufficient foundry manpower is the only brake on pig iron consumption. Foundries have sufficient business, which would put strain on supply. Inventories of iron average less than the allowed 30 days, thus higher melts would find small cushion for absorption and blast furnaces would immediately feel the pressure. Shortage of cast scrap places heavy burden on iron. Currently, 39 of the district's 41 blast furnaces are operating. Carnegie-Illinois Steel Corp. on March 26 blew in its Gary No. 4 unit which went out March 14. South Works No. 7 stack, which went down last July for rebuilding will be idle some time yet. Inland Steel Co. on April 3 blew out its Indiana Harbor No. 3 furnace for approximately a month for repairs.

Pittsburgh — The merchant pig iron situation in this area continues tight and the foundry outlook is clouded by shortage of coal, which in turn has impeded coke production. Lack of cast scrap continues to require more than a normal volume of foundry pig iron. Blast furnace activity in the district is unchanged and some iron shipments have been made to steelworks here from points outside the district.

Cleveland — With 13 out of 14 blast furnaces pouring iron throughout March, a new monthly record in output is believed to have been established for this district. Republic Steel Corp. reports



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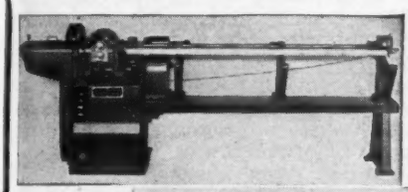

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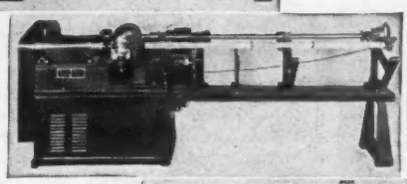

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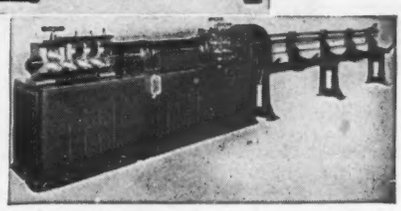

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iron output for all its plants totaled 512,327 net tons, compared with the monthly record of 502,587 tons in March, 1944. Same corporation also established new production records in steel ingots and coke, while production of finished steel of 539,083 tons fell slightly below previous peak of 541,884 tons in March last year. Increase in foundry operations has been noted recently and based on tonnage booked with pig iron sellers there is little indication of a drop in foundry operating schedules through the remainder of this quarter.

Scrap . . .

Scrap Prices, Page 172

Scrap conditions are steady, melters obtaining sufficient for a high rate of operation, but refraining from accumulating heavy inventory in face of the war situation. Ceiling prices prevail on practically all grades except turnings. Labor shortage prevents collection and preparation as freely as desired. Foundries still are short of cast grades.

Chicago — Scrap buying continues steady with volume geared closely to current consumption. Steelmaking continues at full capacity, and in view of good news from the European battlefront mills are not interested in increasing inventories. Prime grades of open-hearth and electric-furnace scrap hold ceiling prices. No. 2 dealer bundles also continue at maximum, although few are available and are not heavily sought after, while baled machine shop turnings remain $2 below. Blast furnace grades, although unchanged pricewise, show some improvement in demand, being influenced to some extent to better prices obtainable for shipment out of the district.

Cleveland — Consumption of iron and steel scrap increased somewhat during March and April, reflecting upturn in steel ingot production and foundry operations. Both mills and foundries have increased scrap inventories moderately in the past 30 days, due to freer movement on orders. Consumers and dealers are reluctant to accumulate too much tonnage. Good open hearth grades remain at ceiling price levels, but weakness in turnings persists.

Boston — Allocations include a moderate tonnage of electric furnace grade to one district steelworks. Good quality heavy melting steel is still scarce, although supply of unprepared has improved slightly. Nevertheless inventories of steelmaking scrap are not being replenished materially; rejections are noted and to that extent consumers are easing demand. Current pressure on prices emanates for the most part from buyers for outside delivery, centered mainly in turnings. However, turnings have been easy for some time without a further spread in under-ceiling prices. Cast supply is below demand. Torpedo station, Newport, R. I., has closed on miscellaneous scrap, including 250 tons of borings and turnings.

Los Angeles — Scrap is more plentiful here than in most industrial areas, with prices $3 to $5 under ceilings. Steelmakers have stockpiles of a month or more, depending on buying policies based on probability of end of the European war.

Pittsburgh — Although there has been a slight increase in movement of scrap here, due to better weather, there has also been an upward movement in consumption so that the relative position has not changed. Buying is still active and the market is strong. Turning prices are again edging upward and some sales have been reported, but not confirmed, at ceiling levels. Cast scrap is tight and there has been a shortage of heavy top-grade material. Inventories held by plants are mostly below the 30-day level.

Cincinnati — Iron and steel scrap appears steady. Mills currently are not placing new orders, but considerable tonnage is due on old commitments. Some district interests hold that heavy grades show underlying strength which will resist factors linked with early war end. Foundry scrap continues scarce. Tonnage of material, except good cast and rails, is adequate. Shipping and labor for preparation and handling are the bottlenecks.

Birmingham — Lack of manpower for scrap preparation is hindering movement from dealers' yards. Demand generally is strong, with blast furnace material more plentiful than other grades. Little cast is available.

Buffalo — Early opening of navigation gives hope of additional scrap supply, two ships having left for Duluth to load winter accumulations for this area. Quality scrap is scarce and mills have made large withdrawals from stockpiles to balance heavy influx of turnings. Rumors of machine shop turnings selling below $13 per ton are believed unfounded, though supply is heavy.

Philadelphia — Notwithstanding shortage of cars heavy melting steel continues to move more freely, with consumers pressing for tonnage under contract, but still hesitant as to new contracts, apparently because of possibility of European peace. Supply of turnings continues to increase, with two consumers temporarily out of the market. Prices on these grades are easier, though generally steady.

New York — The scrap trade here does not expect important shipments to Buffalo over the barge canal, scheduled to open soon, until late in the spring, due to pressure for tonnage for Sparrows Point and eastern Pennsylvania destinations. Melting steel is moving more freely and turnings are plentiful, although prices have not been affected in this district.

St. Louis — Scrap supply is light with rains and high water preventing expected shipments. Heavy melting steel and foundry grades are most in demand, with prices at ceiling except for machine turnings. Mill reserves are at about 30 days and some consumers are satisfield at that level in view of war conditions.

Warehouse . . .

Warehouse Prices, Page 170

Cleveland — Steel distributors are two to three weeks behind delivery schedules on tonnages involving cutting and shearing operations. Compared with 1941 level, the operating personnel in warehouses has declined over 50 per cent in most instances. However, due to substantial increase in hours per week and fact that individual orders are larger with consequent drop in shearing operations, distributors are handling nearly 50 per cent more tonnage than in the comparable 1941 period. Warehouses

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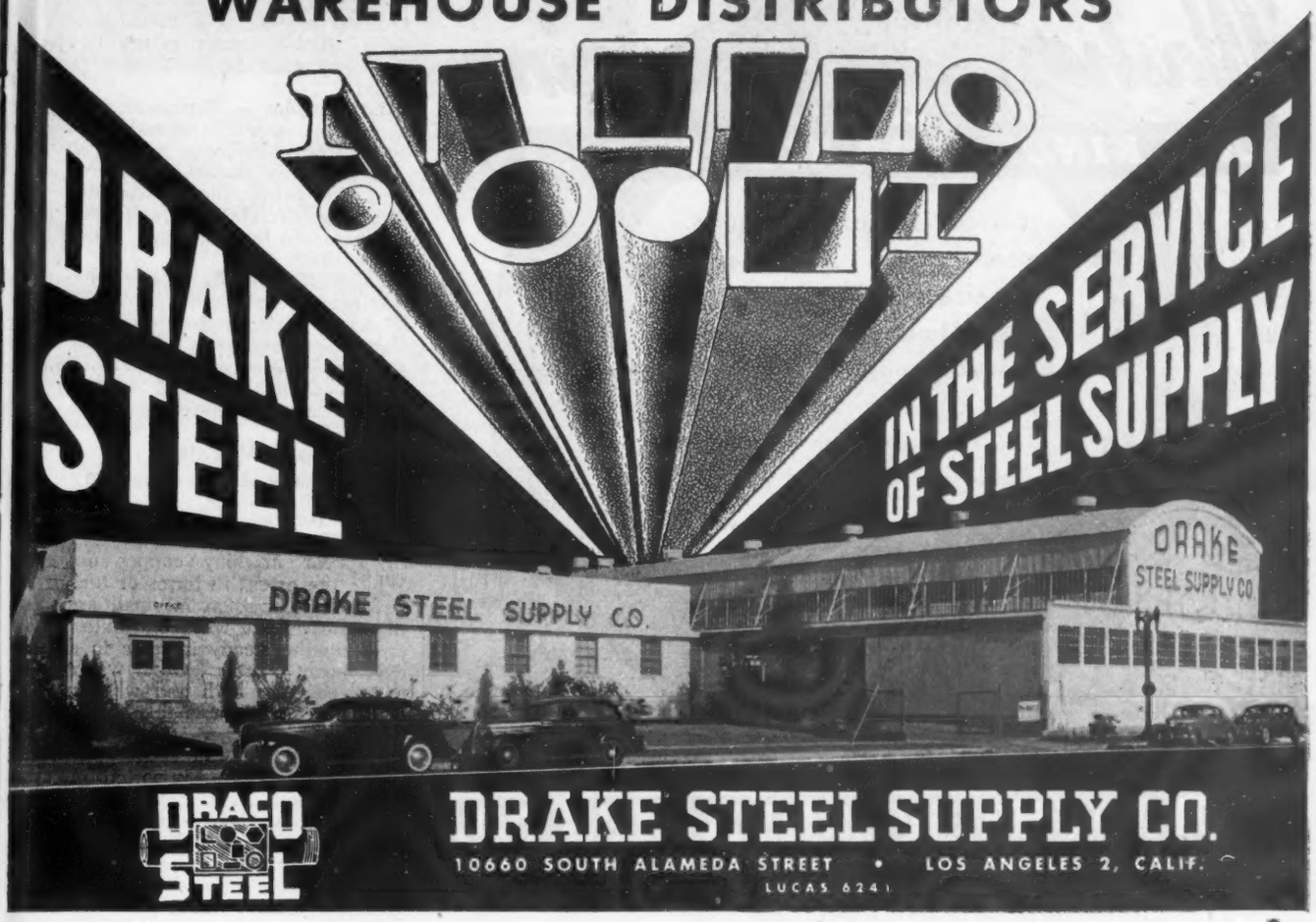

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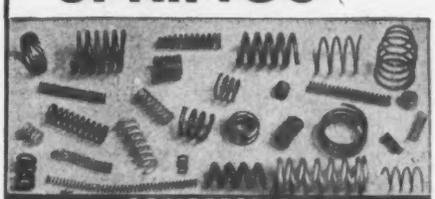

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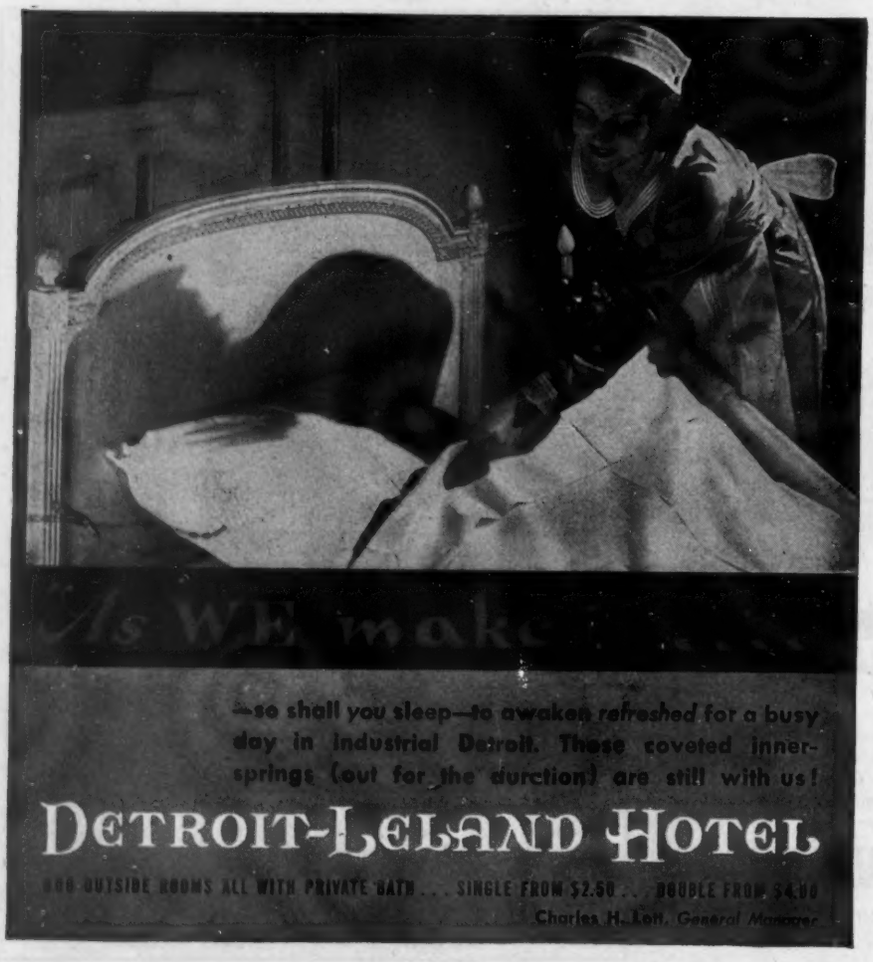

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Charles H. Loh, *General Manager*

continue to feel the impact of additional business originating from consumers' inability to obtain promised mill deliveries. Further decline in distributors' stocks is noted.

Los Angeles — Replacements are not keeping pace with demand for tubular goods from warehouse, as well as alloy and galvanized sheets, though most orders are being filled. Overall inventories are declining, though war plants are sustained by direct mill deliveries in many cases.

St. Louis — Warehouse inventories continue to shrink and are expected to be worse during second quarter. Many complain that pressure on mills for sheets and strip prevents shipment to jobbers. Stocks are depleted and calls for carload lots are increasing.

Nonferrous Metals . . .

Nonferrous Prices, Page 173

New York — Cutbacks in small arms ammunition are ahead and are expected to appear in May copper deliveries. While the extent in terms of tons is not definite the revision in small arms ammunition output will contribute toward arresting the steady increase in demand over recent months. Other war requirements continue high and whether more copper will be available for civilian products at midyear is questionable, in view of limited domestic production and dependence on imported metal to meet demand in recent months. The stockpile has been reduced materially, probably about 100,000 tons. Orders for May delivery will be heavy this week.

Since zinc went under allocation, demand for prime western is not as strong, although available supply of special high-grade is absorbed. Indications are that total sales this month will be slightly below last.

Further check on end use products taking lead is provided for in a new order designed for additional conservation, with the stockpile still declining. Consumers must file requirements for foreign lead not later than on the 18th of the month. Foreign lead arrivals have been below expectations.

Manganese Ore . . .

Iron Ore Prices, Page 170

New York — Two cargoes of Russian manganese ore are expected to arrive in this country soon, the first to come through the Dardanelles since early days of the European war. These will be the first of possibly 300,000 tons from Russia in the next 12 months.

Ferroalloys . . .

Ferroalloy Prices, Page 171

New York — Due to necessity of having to use a higher percentage of ores of lower grade, plus steadily increasing overall production costs, a leading seller has advanced spot prices on tungsten metal powder and ferrotungsten.

This interest is now quoting tungsten metal powder, sized to 65 mesh x D, packed, containing not less than 97 per cent tungsten, at $2.50 per pound of powder in lots of 1000 pounds or more and $2.60 in quantities less than 1000 pounds. This represents an increase of five cents on the larger quantities and ten cents on the smaller. Delivery is f.o.b. cars, Niagara Falls, N. Y., with railroad freight charges allowed to des-

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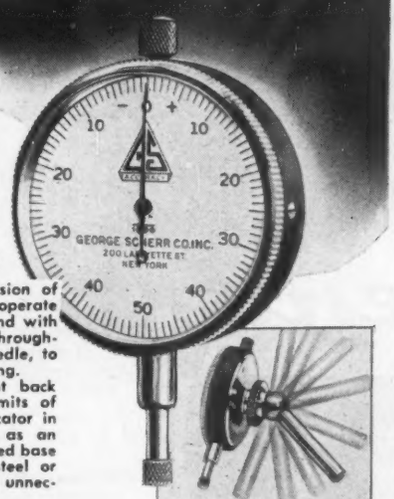

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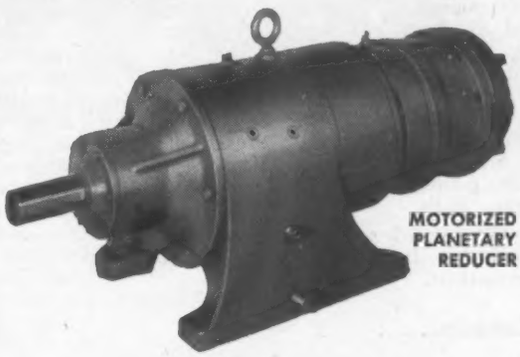

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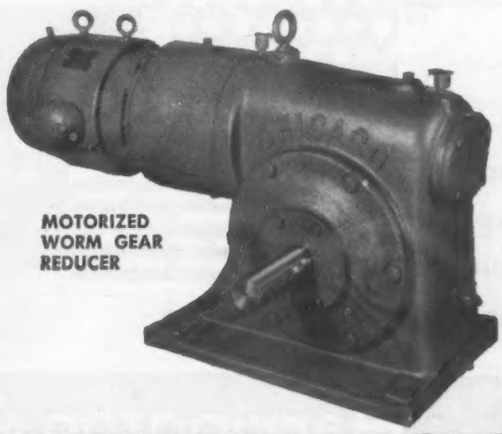

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tination, but not in excess of rates to St. Louis.

New schedules on ferrotungsten, sized to ¼-inch x D and packed in suitable containers, is $1.90 contained for quantities of 10,000 pounds of W or more, this representing an increase of two cents a pound on quantities of 10,000 pounds and higher, but less than carlots, and four cents on carlots; $2 on lots of 2000 to 10,000 pounds of W, an increase of four cents; $2.10 on 100 pounds to 2000 pounds W, an increase of two cents; and $2.15 on less than 100 pounds of W, no change.

Deliveries in quantities of 2000 pounds W or more is f.o.b. cars, Niagara Falls, N. Y., basis, with freight charges allowed to destination, but not in excess of rate to St. Louis. In quantities of less than 2000 pounds, delivery is f.o.b. cars, Niagara Falls.

The revised schedules comply in all particulars, it is pointed out, with OPA regulations.

Canada . . .

Toronto, Ont. — Some slowing is noted in Canadian iron and steel markets as a result of the long Easter holiday weekend, but there has been no curtailment in demand for steel and producers report record backlogs in connection with which deliveries now extend well into third quarter. Only limited capacity is available in second quarter, confined to items that are in small demand. There has been no easing in supply for nonwar consumers but there has been renewed interest in buying by civilian interests expecting an early end to the European war.

According to reports from Ottawa, Canada's war and other expenditures from now until the end of August, will approximate $2,500,000,000, of which $1,600,000,000 will be obtained through a new Victory Loan under way this month.

Notwithstanding some reduction in buying during the past week or 10 days, mill representatives state it is well in excess of production and see no indication of slackening in demand and production of steel this year. Steel company heads seek an advance in steel prices, but to date have had little or no effect.

Little change is reported in sheet steel, supply remaining tight with no indication of early easing. Contracting is at a moderate rate, largely due to the fact that mills are filled with orders and are unable to give definite delivery promises over the next six months. The Steel Co. of Canada, Hamilton, Ont., has started work towards bringing its capacity for sheets, strip and tin plate up to 400,000 tons per year, but this enlarged unit will not be ready for operation for several months, and is not expected to have effect on relieving pressure on sheets much before the end of this year.

Only limited bar tonnages are being made available to nonwar consumers and only the more essential of these are obtaining delivery. While there has been some reduction in bar deliveries to agricultural implement makers no curtailment has been placed on rolling stock builders. Increased demand on shipbuilding account also has been reported during the past week or 10 days, and bar mills now are said to be solidly booked on practically all sizes through most of third quarter.

With new construction undertakings developing more action, demand for structural shapes and reinforcing bars has been gaining momentum and there has been a steady outpouring of orders ranging from 100 to 2500 tons. While there has been some improvement in deliveries of structural shapes, fabricators still are several weeks behind schedule, which tends to delay some of the larger construction projects.

Some pig iron melters have covered for second quarter but most follow hand-to-mouth buying. With prompt delivery the rule, most melters are satisfied to place orders as demands dictate especially as contracts give no protection against price advance.

Scrap iron and steel receipts continue to show improvement and there has been considerable movement of scrap from the country during the past two or three weeks. New scrap drives are being organized and are expected to develop substantial tonnages between now and the end of May. While a large part of the incoming scrap is in steelmaking grades, there also has been improvement in supply of iron scrap. Local dealers again are filling orders for cast scrap and stove plate but the supply is still below actual requirements, although the balance is being corrected.

Steel in Europe . . .

London — (*By Radio*) — Sheets are booked into third quarter on mills in Great Britain and deliveries on steel generally are lengthening. Rail mills are fully occupied to meet demands. Plate buying is easy compared with previous periods. Activity in light castings is improving.

The Harrington & King Perforating Co.
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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4800 tons, commercial building for Best & Co., New York, reported tentatively placed through John Lowry Co., to Harris Structural Steel Co., New York.

2850 tons, truck tire plant, Kansas City, Kans., for Lee Rubber & Tire Corp., to Kansas City Structural Steel Co., Kansas City, Kans.; Giffels & Vallet Inc., Detroit, engineers.

900 tons, two Navy warehouses at Bayonne, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, boilerhouse, Baldwin Locomotive Works, Eddystone, Pa., to Belmont Iron Works, Philadelphia.

325 tons, 200-foot through truss railroad span, Alaska, for U. S. Department of Interior, to Virginia Bridge Co., Roanoke, Va.

175 tons, addition to nylon plant for du Pont interests at Martinsville, Va., to Bethlehem Fabricators, Bethlehem, Pa.

120 tons, addition to Navy hospital, Philadelphia, sublet through Lehigh Structural Steel Co., Allentown, Pa., to Phoenix Bridge Co., Phoenixville, Pa.

STRUCTURAL STEEL PENDING

900 tons, addition, Link-Belt Co., Indianapolis.

700 tons, freight depot and office building, Indianapolis, for New York Central railroad.

675 tons, addition and alterations, Bridgeport Brass Co., Indianapolis.

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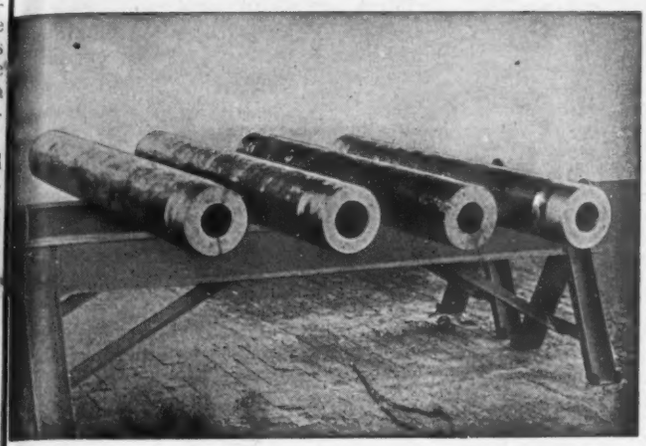

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- Architecture
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- Civil Engineering

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Fort Wayne AEI Indiana

525 tons, 65 tons in turntable extension, Cleburne, Tex., and 460 tons in underpass beam spans, Fort Worth, Tex., for Atchison, Topeka & Santa Fe railroad; bids April 3.

500 tons, warehouses and building, Joliet, Ill., for Kankakee Ordnance Plant; bids April 4.

245 tons, Bamburger underpass, Arsenal, Utah, for federal government.

REINFORCING BARS . . .

REINFORCING BARS PLACED

350 tons, Charleston ordnance plant, Charleston, Ind., to Colonial Supply Co., Louisville, Ky.

200 tons, expansion, Gopher Ordnance Works, Rosemont, Minn., for E. I. du Pont de Nemours & Co. Inc., 140 tons to Ceco Steel Products Corp., Minneapolis, and 60 tons to Bethlehem Steel Co., Bethlehem, Pa.; bids March 22.

174 tons, bridge, Braden, Okla., to Capitol Steel Co., Oklahoma City, Okla.

125 tons, Ford Motor Co., Lincoln plant test cell building, Detroit, to Truscon Steel Co., through Cunningham - Rudy Construction Co., contractor.

100 tons, bridge on Route 5, Pontiac, Ill., for state highway commission, to Concrete Steel Co., Chicago; Thomas McQueen Co., Forest Park, Ill., contractor; bids Feb. 24.

100 tons, Chicago, Burlington & Quincy, repair shops, Denver, Colo., to Colorado Builders Supply Co., Denver, Colo.

REINFORCING BARS PENDING

800 tons, U. S. Navy, inert storehouses, Crane, Ind.; bids March 31.

781 tons, smokeless powder containers. Naval Ammunition Depot, Crane, Ind.; bids April 3; this is in addition to bids taken March 27 on 1375 tons for same purpose.

600 tons mesh and 160 tons bars, contract No. 14 for Idlewild municipal airport, New York; Andrew Gull & De Felice, 518 Porter avenue, Brooklyn, N. Y., low.

175 tons, Cornelius Corp., Minneapolis, Minn.

100 tons, pumping station, Eau Claire, Wis., for city; bids April 11.

100 tons, navy pier, Norfolk Navy Yard, Norfolk, Va.

Unstated tonnage, veterans hospital, Fargo, N. Dak., for U. S. Veterans Administration; bids April 24.

RAILS. CARS . . .

RAILROAD CARS PENDING

Bangor & Aroostook, 50 to 100 seventy-ton hopper cars and 50 to 100 fifty-ton rack cars; bids asked.

Varying Factors Influence Planning for Postwar Era

(*Continued from Page* 89)

duction Board that will be all there is to it. One company authorized to make a popular household appliance found it was impossible to manufacture and sell the item at prewar price due to higher wartime wages. After the last war there was a period of profitless prosperity when plants were busy yet not making money. This was primarily due to the advance in prices of raw materials caused by the different firms outbidding one another for supplies. Hence price control will probably be continued for some time after hostilities cease. The accounting department will be called on to furnish a great deal of information for governmental reports if not to actually prepare many of them.

Now for a look at the backlog of business. How many weeks or months of business is there? If the business on hand is in the form of contracts, are they with the service command most likely to cancel or with a unit most likely to need supplies until well toward the finish? This may seem not to be a part of postwar planning, but the transition period should be taken into consideration. There are some companies who are already in trouble because the original item or items have been cut back to the point where the volume will not carry the present organization and no new item has been contemplated to carry on until the end of the war and they have not received a spot release for civilian production. It is therefore necessary to plan at least three to six months ahead as long as the war lasts and to have the postwar plan ready for execution when victory comes.

Due to the global nature of this war there will probably be a succession of V Days allowing gradual conversion. All previous wars have ended rather suddenly when viewed from 90 days before the actual end. The various phases of this war will probably not be an exception to this rule.

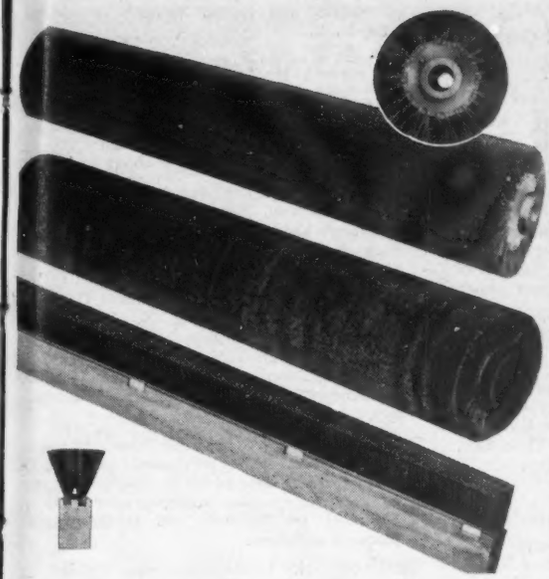
The analysis thus far should show the approximate position of the company as of V Day as to the phases examined. The actual plans, three in number will be supported by the following reports: 1) Blue prints and specifications of product or products to be made. 2) Sales program supported by market studies with volume developed by territories. 3) Outline of method of distribution. 4) Proposed advertising campaign. 5) Organization chart. 6) List of required facilities showing postwar utilization of prewar equipment, disposition of supplies, additions, floor space, direct and indirect labor, department by department. 7) Plant layout. 8) Developed manufacturing costs and gross and net margins of profits by products and volume. 9) Projected profit and loss statements. 10) Projected balance sheets. 11) Cash flow statements giving effect to earnings over three-year period. (12) Cost of getting into production on any new products.

Plan A to be based on bed rock operation in event of a depression caused by unforeseen circumstances. This plan should be based on 40 to 60 per cent of a normal year which should cover the break-even point and keep the figures in the black.

Plan B to be based on a normal year with or without additional products added to the line.

Plan C to be based on a decidedly augmented program with the prewar products scheduled at 150 per cent of the five-year prewar average plus new products to be introduced, taking into consideration the necessary time lag to get into production.

The board of directors or the top executive should then appoint a committee composed of an executive from manufacturing, sales and finance, and as many more as necessary to work out the plans in detail. In making this assignment definite instructions should be



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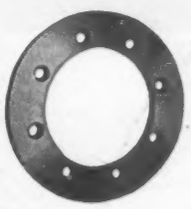

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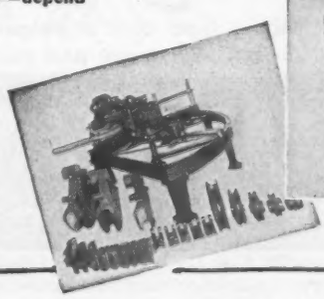

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CONSTRUCTION AND ENTERPRISE

OHIO

CLEVELAND—Linderme Tube Co., 1509 East 219th street, is having plans drawn for a mill-type factory building 60 x 180 feet and machine shop 25 x 120 feet, including a three-ton crane and runway.

COLUMBUS, O.—Jaeger Machine Co. has been granted WPB approval for semimechanized foundry for light castings, hoists, etc., to cost about $243,000.

COLUMBUS, O.—Columbus Engineering Co. has WPB approval for a plant addition 60 x 65 feet, one story for production of gun trunnion brackets and bolt assemblies, to cost about $20,000.

FINDLAY, O.—Master Tire & Rubber Corp. has received WPB approval for a plant building 100 x 340 feet for production of tires and tubes, to cost about $180,000.

GENEVA, O.—Geneva Metal Wheel Co. will build a one-story 25 x 225-foot plant addition. WPB approval for 25 x 80-foot portion is being sought, the remainder to be built after the war.

GENEVA, O.—Hershberg Products Co., Ashtabula, O., manufacturer of battery boxes and similar products, plans erection of a factory here at Eagle and George streets, to cost about $60,000.

WADSWORTH, O.—Bearfoot Scale Co., J. B. Calvin, treasurer, is having plans made by Albert Kahn & Associates, 345 New Center building, Detroit, for a plant addition for which Defense Plant Corp. has allotted $550,000.

WARREN, O.—Denman Tire & Rubber Co. has received WPB approval for an addition to its plant at Leavittsburg, O., including installation of banbury mixer, to cost about $220,424.

MASSACHUSETTS

TAUNTON, MASS.—Board of sewer commissioners has plans completed for postwar construction of sewage treatment plant costing about $500,000. Fay, Spofford & Thorndike, 11 Beacon street, Boston, are engineers.

CONNECTICUT

STAMFORD, CONN.—Stamford Electric Products Co., L. Jacobson, president, has bought site and plans postwar erection of plant addition at Southfield and Sunnyside avenues, at cost of more than $40,000.

RHODE ISLAND

BRISTOL, R. I.—U. S. Rubber Co., 500 Wood street, will let contract soon for a three-story plant building 110 x 160 feet, costing about $125,000.

NEW YORK

BUFFALO—Small Steel Castings Inc. has been incorporated with $75,000 capital by Joseph and Marion Cheney and George M. Nelson, of Buffalo, and Joseph Spriesch of Springville, N. Y.

NEW JERSEY

ATLANTIC CITY, N. J.—Atlantic City Electric Co., R. E. Swift, vice president and general manager, Kentucky and Pacific avenues will build a plant addition costing about $450,000.

BELLEVILLE, N. J.—Liquid Carbonic Corp., 1881 Broadway, New York, has let contract to Walter Kidde Co., 140 Cedar street, New York, for a one-story 162 x 207-foot warehouse estimated to cost about $80,000.

ELIZABETH, N. J.—Edgecomb Steel Co., 460 Hillside avenue, Hillside, N. J., has let contract to D. O. Evans, 1445 North Broad street, for a one-story 55 x 152-foot warehouse addition, costing about $45,000. L. Dennis, 1140 East Jersey street, is architect.

IRVINGTON, N. J.—Keystone Stamping Corp., 55 Cardier street, has let contract to Frank D. Trainer & Son Inc., 12 Smith street, Irvington, for a one-story plant addition, costing about $42,000. G. Hechtel, 106 South Durand place, is architect.

NEWARK, N. J.—Westinghouse Electric & Mfg. Co., foot of Haynes avenue, will let contract soon for altering factory building at cost of about $100,000.

PENNSYLVANIA

STEELTON, PA.—Bethlehem Steel Co., W. B. Lang, assistant general manager, 333 Spruce street, plans a steel foundry addition costing about $85,000.

MICHIGAN

DETROIT—Detroit Sales Engineering Co., 3048 East Outer Drive, has let contract to Cooper Construction Co., 572 Maccabees building, for a manufacturing building, estimated to cost about $60,000.

DETROIT—Todd Steel Corp., 15843 Second Boulevard, has let contract to O. W. Burke Co., 1001 Fisher building, for a one and two-story plant, estimated to cost about $100,000. Andrew Morrison, 3641 Buckingham street, is architect.

DETROIT—United Bronze Corp., 1753 Penobscot building, has been incorporated with $100,000 capital to operate a foundry and general manufacturing business, by Harold V. Raymond, same address.

DETROIT—Microfin Grinding & Engineering Corp., 2014 Book building has been incorporated with $30,000 capital to deal in tools, machines and other products, by Richard J. Phillips, 8035 Vanderbilt street.

DEXTER, MICH.—Robotools Inc., 8155 Huron street, has been incorporated with 20,000 no par shares Class A and B., to manufacture machines, tools and appliances, by James D. Porter, 4701 Delhi road, Dexter.

ST. JOSEPH, MICH.—Holden Castings Corp., 607 Ann street, has been incorporated with 50,000 shares no par value to manufacture metal castings, tools, machinery and equipment, by Walter E. Pearson, 810 Broad street, St. Joseph.

ILLINOIS

BLOOMINGTON, ILL.—Sylvania Electric Products Co. Inc. will let contracts soon for manufacturing plant here from plans by C. Wagner, architect, 133 West Fourth street, Williamsport, Pa., J. J. Woltman, Bloomington, is consulting engineer.

CHICAGO—Ideal Cabinet Co., 3914 West Cornelia avenue, has plans by F. Klefstad, 3600 West Fullerton avenue, for a two-story addition 28 x 100 feet.

CHICAGO—Stein Bros. Mfg. Co., 231 West Green street, has let contract to H. Kaplan Co., 751 North Paulina avenue, for a one-story 125 x 310-foot plant, estimated to cost $100,000. A. Epstein, 2001 West Pershing road, is engineer.

MONEE, ILL.—Cardox Corp., 207 North

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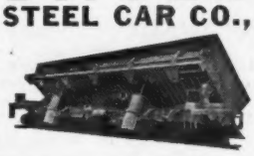

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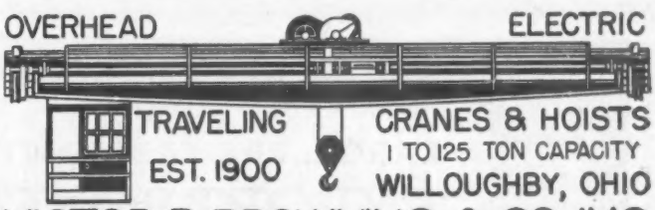

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Michigan avenue, Chicago, has let contract to J. Mitterman, 2848 West Fifty-ninth street, Chicago, for a one-story plant addition and remodeling, estimated to cost about $50,000. C. D. Faulkmer, 307 North Michigan avenue, Chicago, is architect.

SPRINGFIELD, ILL.—Gothard Mfg. Co., 1800 North Ninth street, has let contract to R. B. Evans Construction Co., 401 North Walnut street, for a one-story 50 X 200-foot plant for manufacture of electronic devices, to cost over $40,000. H. B. Helmie, First National Bank building, is architect.

INDIANA

FORT WAYNE, IND.—Phelps Dodge Copper Products Corp., Lincoln Highway East, plans a one-story manufacturing plant on 31-acre site on Lincoln Highway, to cost about $4,500,000.

INDIANAPOLIS—Indianapolis Power & Light Co., 11 North Meridian street, plans a one-story powerplant addition at its Harding street plant, to cost about $3,600,000. Gibbs & Hill Inc., 450 Seventh avenue, New York, are consulting engineers.

INDIANAPOLIS—United Screw Products Inc., 1192 Kentucky avenue, has been incorporated with 100 shares no par value to manufacture parts for marine equipment and motor vehicles, by S. C. John, L. F. Armstrong and E. C. Weaver Jr.

LA PORTE, IND.—Screw Machine Products Co. Inc., 515 Boston street, has been incorporated with 200 shares of $100 par value stock to manufacture screw machines and their products, by George C. Warner, Keith H. Jones and Robert A. Warner.

MARYLAND

BALTIMORE—Crown Cork & Seal Co., Eastern avenue, will let contract soon for a one-story machine shop on Federal, Latrobe and Barclay streets, to cost about $50,000. L. R. White Jr., 10 West Chase street, is architect.

TENNESSEE

FOUNTAIN CITY, TENN.—Fountain City sanitary district plans postwar construction of sewage disposal plant and sanitary system to cost about $1,500,000.

MISSOURI

ST. LOUIS—American Stove Co., 2001 South Kingshighway, Zone 10, has let contract to Gamble Construction Co., 620 Chestnut street, for a stove factory 100 x 128 x 219 x 135 feet, to cost about $40,000.

MINNESOTA

OSSEO, MINN.—G. M. Heesen, clerk, has plans by R. D. Thomas & Associates, 1200 Second avenue South, Minneapolis, engineers, for a sewage treatment plant and sewers, to cost about $75,000.

TEXAS

GALVESTON, TEX.—Black Hardware Co., 2217 Strand street, has let contract to William Roitsch & Son, 2102 Forty-fourth street, for a plant unit and rehabilitation shop, estimated to cost about $45,000. R. R. Rapp, Guaranty Bank building, is architect.

HOUSTON, TEX.—Peden Iron & Steel Co., 700 North San Jacinto street, has bought site and plans plant expansion after the war, at cost of about $100,000.

HOUSTON, TEX.—Ford Motor Co., Shell building, and Dearborn, Mich., has bought eight acres and plans postwar construction of one-story parts building costing about $750,000.

HOUSTON, TEX.—Standco Bolt Co., 2701 Clinton drive, has plans for postwar reconstruction of its plant, to cost $100,000 or more.

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CALIFORNIA

LONG BEACH, CALIF.—Commercial Welding Works has been established at 1327 Junipero avenue by Delbert L. Prather and William C. Allen.

LOS ANGELES—Rich Steel Co., 701 Gibbons avenue, has been formed as a partnership by Gustav R. Rich, Miriam Rich and Louis E. Gordon.

LOS ANGELES—Cajalco Tin Industries has been incorporated with $500,000 capital by J. P. Morley, Sam Adams and Oliver O. Clark, the latter being representative, at 403 West Eighth street.

LOS ANGELES—Industrial Alloys has been formed by Leo Shriver, Stanley Biddle and E. M. Cregar and is conducting business at 1313 East Sixty-first street.

LOS ANGELES—ABSCO Welded Products Co., 5244 West Adams street, has been formed by Lewis Boyd Adams and associates.

LOS ANGELES—C. & L. Tooling & Machining Co., 2242 Sepulveda avenue, has been formed by George H. Bentley and Ted W. Lawson.

LOS ANGELES—California Steel Treating Co., 2850 East Washington boulevard, is having plans prepared by W. M. Bostock, structural engineer, 2534 Live Oak avenue, Huntington Park, Calif., for a plant addition 22 x 80 feet.

LOS ANGELES—Universal Metal Products Ltd., 2940 East Olympic boulevard, has building permit for a machine shop addition 50 x 100 feet, to cost about $9000.

LOS ANGELES—Irwin W. Masters Inc., 3035 Andrita street, is building a new machine shop and plant addition, costing about $9500.

OAKLAND, CALIF.—Oliver Tire & Rubber Co., 4343 San Pablo avenue, will make $400,000 plant expansion, DPC making $200,000 appropriation toward work.

PACIFIC GROVE, CALIF.—City, City Hall, plans postwar construction of a sewage disposal plant costing $250,000 and sewer work costing $50,000.

RICHMOND, CALIF.—Food Machinery Corp. has bought 14 acres in North Richmond for postwar plant to manufacture food-processing machinery.

SAN DIEGO, CALIF.—L. & M. Saw Works has been organized by M. H. Manning and is established at 2050 National avenue.

SOUTH GATE, CALIF.—Brisbane & Co., 8653 Atlantic avenue, will build steel frame plant additions with five crane runways, to cost about $50,000. James C. Barr, 3404 South Flower street, is engineer.

OREGON

WARRENTON, OREG.—Anderson & Hendrickson Marine Depot & Supply Co., 1303 Franklin avenue, Astoria, Oreg., has obtained WPB priorities for construction of a machine shop, warehouse, oil dock, three marine ways and other facilities at Skinanon Channel, Warrenton.

CANADA

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 171 Eastern avenue, is having plans prepared by James Proctor & Redfern Ltd., 36 Toronto street, for a plant addition, estimated to cost with equipment about $50,000.

MONTREAL, QUE.—Dominion Rubber Co. Ltd. has appointed Pringle & Son, 485 McGill street, consulting engineers, to prepare plans for a new plant to cost about $1,000,000. Five buildings now are being demolished to make room for the new plant.

THETFORD MINES, QUE.—Asbestos Corp. Ltd. plans plant addition to cost, with equipment, $65,000.

VILLE ST. PIERRE, QUE.—Dominion Brass & Aluminum Foundry, 5244 Casgrain street, plans construction of a foundry on Milton street, estimated to cost with equipment about $50,000.

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